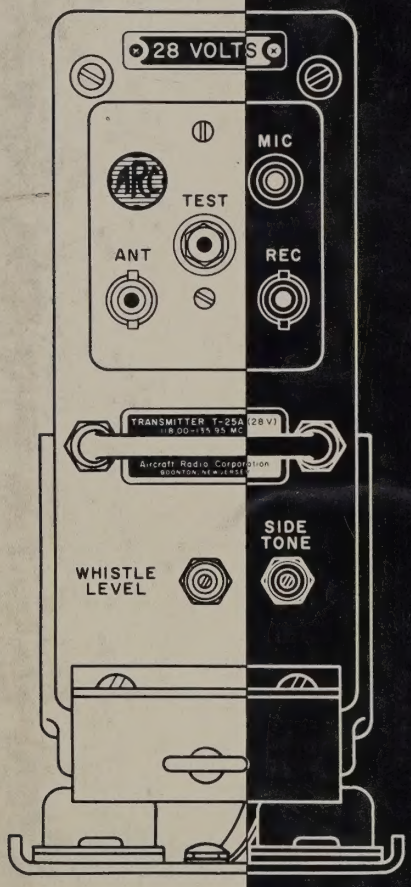
ARC TYPE T-25A
VHF TRANSMITTER



Aircraft Radio Corporation

Boonton • New Jersey

ARC TYPE T-25A
VHF TRANSMITTER

Aircraft Radio Corporation
Boonton • New Jersey

7010095
ARCIB-T25A-2
February 1960

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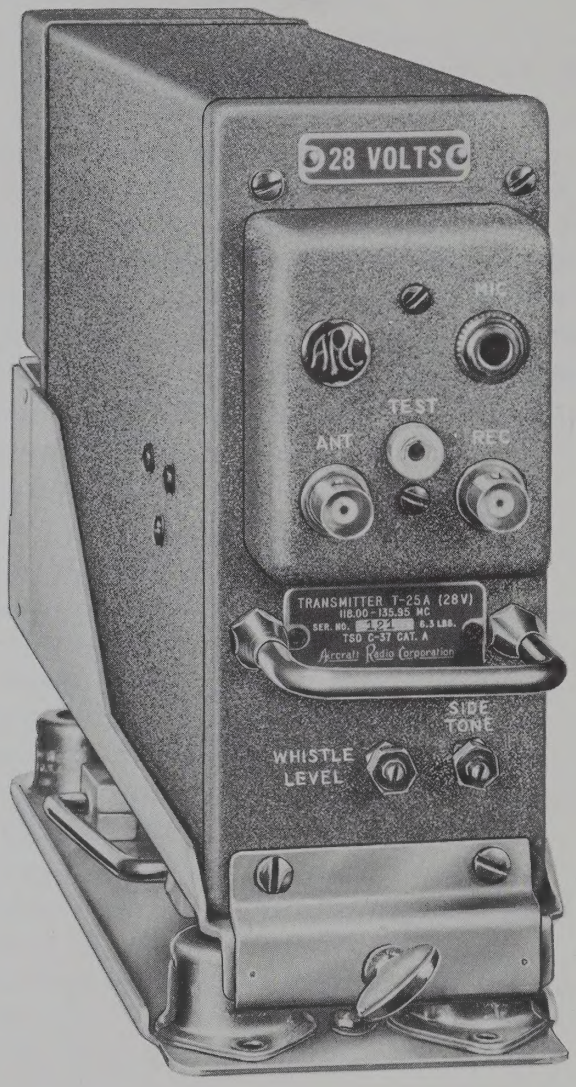

Figure 1–1. ARC Type T-25A VHF Transmitter with ARC Type M-41A Mounting

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SECTION I
GENERAL INFORMATION

1–1. INTRODUCTION.

This instruction book contains installation, operation, principles of operation, and maintenance instructions for the ARC Type T-25A VHF Transmitter. Information is also included for the ARC Type C-82A Control Unit and the ARC Type DV-12A Dynaverter®.

1–2. PURPOSE.

The T-25A Transmitter is an airborne, 360-channel, voice amplitude-modulated transmitter. The transmitter is electrically tuned and crystal controlled, and covers the frequency range of 118.00–135.95 mc in 50-kc steps to provide a total of 360 channels.

1–3. SPECIFICATIONS.

Frequency:	118.00–135.95 mc
Number of Channels:	360
Channel Spacing:	50 kc (0.05 mc)
Channeling Time:	4 seconds, maximum
HV Power:	250 volts dc, 140 ma (may be supplied by an ARC Type DV-10A, DV-11A, or DV-12A Dynaverter; or by an ARC Type D-10A Dynamotor, of the correct voltage rating)
Total Input Power:	T-25A and Dynaverter Stand-by: 1.6 amperes at 13.75 volts dc or 0.9 ampere at 27.5 volts dc Transmit: 7.2 amperes at 13.75 volts dc or 3.3 amperes at 27.5 volts dc T-25A and Dynamotor Stand-by: 1.2 amperes at 13.75 volts dc or 0.7 ampere at 27.5 volts dc [1] Transmit: 7.8 amperes at 13.75 volts dc or 4.0 amperes at 27.5 volts dc
Power Output:	6–10 watts, 8 watts nominal
Modulation:	High level. High percentage without over-modulation, controlled by limiting circuit
Tuning:	Automatic, crystal controlled. Eighteen crystals on megacycle drum; fundamental frequency range, 54.00–62.50 mc in 0.5-mc steps. Twenty crystals on fractional megacycle drum; frequency range, 10.00–10.95 mc, in 0.05-mc steps
Frequency Stability:	±0.0075%
Spurious Emission:	Less than 50 μw
Sidetone:	Adjustable to 100 mw
Tube Complement	6021 Megacycle crystal oscillator and doubler 6021 Fractional megacycle crystal oscillator and balanced mixer 5718 Whistle-through tone oscillator 5840 R-f amplifier 5686 R-f driver amplifier 6360 Push-pull power amplifier
Transistor Complement:	2N585 First a-f amplifier 2N217 Second a-f amplifier 2N375, 2N375 A-f driver amplifier 2N375, 2N375 Push-pull modulator 2N176 Transient limiter
Diode Complement:	1N90 R-f output detector 1N1351A Voltage regulator diode 1N1364 Transient detector HD-6226 Transient limiter
Mounting:	ARC Series 40 Mounting (for single-unit installation, use an ARC Type M-41A Mounting)
Weight:	6.3 pounds, less mounting; 7.7 pounds, including M-41A Mounting [2]
Dimensions:	3 7/32 in. wide, 7½ in. high, 14¼ in. long over-all, including M-41A Mounting
Applicable TSO:	Certified to FAA TSO C-37, Category A (altitude to 60,000 feet)

[1] Dynamotor input current not included.
[2] 7.3 and 8.7 pounds, respectively, with DV-12A installed.

1–4. EQUIPMENT SUPPLIED.

The units and accessories supplied for a T-25A installation are listed in Table 1–1. The T-25A Transmitter and the M-41A Mounting are shown in Figure 1–1.

TABLE 1–1. EQUIPMENT SUPPLIED

Qty	Name	ARC Part No.
1	Transmitter ARC Type T-25A [1]	21600
1	Connector Kit consisting of:	22366
1	Connector	21983
1	Plate	22287
6	Sems, fillister head, No. 4-40, ¼ in. long, split lockwasher	524(¼)
2	Screw, machine, flat head, No. 6-32, 5/16 in. long	146(5/16)
2	Stud, snapslide	22237
2	Connector, coaxial (UG-88C/U)	11337
1	Instruction Book	——

[1] The T-25A is supplied in either a 14-volt or a 28-volt model.

1–5. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

The cable assemblies required for interconnecting the T-25A Transmitter and its associated units are not supplied. The cable assembly which connects to the rear of the mounting is fabricated from individual wires (not furnished) and the connector kit listed in Table 1–1. The antenna cable assemblies are fabricated from RG-58/U coaxial cable (not furnished), and are terminated at the T-25A by the coaxial connectors listed in Table 1–1. In addition, the units listed in Table 1–2, or their equivalents, are required for operation of the T-25A. Voltage-rated items should have the same rating as the T-25A.

TABLE 1–2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

Qty	Name	ARC Type No.	ARC Part No.
1	Antenna	A-15	16630
1	Dynaverter [1]	DV-10A	19840
		DV-11A	21100
		DV-12A(14V)	23400-0014
		DV-12A(28V)	23400-0028
	Dynamotor [1]	D-10A(14V)	14401
		D-10A(28V)	14402
1	Control Unit [2]	C-82A	21590
AR	Cable, coaxial (RG-58/U)	——	[3]11318(*)
1	Microphone, carbon, single-button	——	11937
1	Mounting [4]	Series 40	——

[1] The T-25A high voltage is obtained from a Dynaverter or a dynamotor of the correct input voltage rating. The DV-12A is mounted on the rear of the T-25A. The other Dynaverters or dynamotor may be installed on an associated ARC vhf receiver or on an ARC Type P-12 Power Unit.
[2] The C-82A is furnished with 28-volt pilot lamps installed and with 14-volt lamps as accessories.
In place of the C-82A, a custom control installation with either Channel Selector Switch ARC-20730 or ARC Type CC-10A Custom Control Unit (ARC-24020), and a power on-off switch, may be used.
If SCS-DCS operation of the T-25A is desired (see Figure 2–16), Rotary Switch ARC-20332, Knob Assembly ARC-20399, and Lockwasher ARC-8661, or equivalents, are also required.
[3] In place of asterisk, cable length in feet and inches is specified to complete part number.
[4] For single-unit installation, use an ARC Type M-41A Mounting (ARC-21790).

1–6. DESCRIPTION.

Transmitter. The ARC Type T-25A VHF Transmitter is a miniaturized, 360-channel, crystal-controlled, voice amplitude-modulated transmitter designed for operation in the vhf frequency range of 118.00–135.95 mc. Electron tubes are used in the transmitter circuit and transistors are used in the modulator circuit. The T-25A includes a whistle-through circuit which permits precise tuning of a manually tuned associated receiver to any one of the 360 transmitting frequencies available.

The T-25A employs a crystal-saving circuit which requires 38 crystals for 360 channels. The crystals are divided between two crystal drums. The 18 crystals which control the frequency of the megacycle oscillator-doubler are mounted on a drum called the megacycle crystal drum. The 20 crystals which control the frequency of the fractional megacycle oscillator are mounted on a drum called the fractional megacycle crystal drum. Any one of the 360 frequencies available is obtained by mixing the frequency-doubled output of one crystal on the megacycle crystal drum with the fundamental frequency output of one crystal on the fractional megacycle crystal drum. The transmitter megacycle crystals cover the range of 54.00–62.50 mc in 0.5-mc steps. The crystals on the fractional megacycle crystal drum cover the frequency range of 10.00–10.95 mc in 0.05-mc steps.

The T-25A consists of two major assemblies: a transmitter assembly which contains all transmitting circuits and serves as the main chassis for the unit, and a plug-in modulator assembly which is fastened to the bottom of the transmitter assembly by four captive screws. The transmitter assembly uses six tubes, four of which are subminiature types soldered directly in the circuit; the other two are plug-in types. The transmitter circuit consists of an oscillator-doubler for generating megacycle frequencies from 108–125 mc, an oscillator-balanced mixer for addition of the fractional megacycle frequencies of 10.00–10.95 mc, two stages of r-f amplification for the resultant transmitter frequency range of 118.00–135.95 mc, and a push-pull power amplifier output. Megacycle tuning of the transmitter stages is effected by a set of variable capacitors driven by a cam on the megacycle crystal drum shaft. Fractional megacycle tuning is effected by inductive trimmers driven by a cam on the fractional megacycle crystal drum shaft. A tone oscillator is included in the transmitter assembly to provide the audio signal for whistle-through tuning. A 1N90 crystal detector circuit, connected to the TEST jack on the front panel of the T-25A, is used for checking the presence of r-f output with an external d-c meter.

The modulator assembly employs two low-current and five power a-f transistors. The modulator circuit consists of a first a-f amplifier, a second a-f amplifier, an

a-f driver amplifier, and a push-pull modulator. A transient-limiting circuit consisting of a Zener diode and an a-f power transistor is included on the modulator chassis. This circuit protects the transistors by detecting and limiting any positive transients appearing in the primary power source.

All electrical connections for the T-25A are made through a receptacle, located at the rear of the unit, which mates with a connector on the M-41A Mounting or other ARC Series 40 Mounting.

The dust cover for the T-25A is secured to the chassis by 12 screws. These screws also insure adequate dissipation of the heat generated within the unit. Two rectangular windows in the cover permit the frequency setting of the drums to be checked without removing the cover.

Mounting. The ARC Type M-41A Mounting, or other ARC Series 40 Mounting, is used to shock-mount the T-25A Transmitter and to provide a means of making electrical connections to the unit. The T-25A is secured by an adjustable flange located at the front of the mounting. Two flexible metal straps located on the underside of the mounting are used to ground the T-25A and M-41A to the airframe. Eight No. 6 screw holes are provided in the M-41A for securing the mounting.

Note

If more than one T-25A is to be installed, or if a T-25A is to be installed with other ARC modular-type units, one of the multiple-unit ARC Series 40 Mountings may be used. For detailed information, refer to the instruction book for the ARC Series 40 Mountings.

DV-12A Dynaverter. The ARC Type DV-12A Dynaverter is a transistorized power converter designed to transform low-voltage dc to high-voltage dc. The unit is a plug-in module installed on the rear of the T-25A and enclosed by the T-25A dust cover.

Note

The dust cover of some T-25A Transmitters will not accommodate the DV-12A. If the DV-12A is installed in these units, a new cover (ARC-23692) is required.

All parts of the DV-12A are mounted on an aluminum chassis, with the power transistors securely fastened to the frame to promote heat dissipation. Four No. 4 captive screws are provided for securing the DV-12A to the T-25A. Input and output connections are made through a three-terminal plug.

C-82A Control Unit. The ARC Type C-82A Control Unit is an edge-lighted, plastic-panel control assembly designed for use in aircraft equipped with console mounting facilities. The C-82A contains a primary power on-off switch, and channel selector switches which are used to select the transmitting frequency. The megacycle channel selector switch is a geared, 18-position, printed-circuit, revolving drum assembly which controls the positioning of the megacycle crystal drum in the T-25A. The fractional megacycle channel selector switch is a 20-position, revolving drum assembly which controls the positioning of the fractional megacycle crystal drum in the T-25A. The selected frequency is indicated on the individual dials associated with each switch. Edge-lighting of the controls and panel designations is provided by two midget flange-base lamps installed in red-filter light assemblies on the plastic panel. All electrical connections to the C-82A are made through a receptacle located at the rear. The unit is secured by four Dzus fasteners on the front panel.

Note

In place of a C-82A Control Unit, a custom control installation with Channel Selector Switch ARC-20730 or ARC Type CC-10A Custom Control Unit, and a power on-off switch, may be used.

Accessories. The accessories for the T-25A Transmitter consist of a connector kit and two UG-88C/U coaxial connectors. The connector kit consists of the connector, which mates with the T-25A connector, and the necessary hardware for installing the connector on the T-25A mounting.

SECTION II
INSTALLATION AND ADJUSTMENT

2–1. UNPACKING.

Carefully unpack the ARC Type T-25A VHF Transmitter and accessories. Inspect the shipment for damage, and check off the items received against the packing slip and list of equipment supplied (Table 1–1).

2–2. PREINSTALLATION TESTS.

Before installation, the T-25A should be bench-tested for channeling performance, power output, and modulator performance as described in paragraph 5–5 and Table 5–2. The test equipment required is listed in Table 5–1, and the bench test set-up is shown in Figure 5–7 or Figure 5–8.

2–3. INSTALLATION CONSIDERATIONS.

The T-25A Transmitter is designed for remote operation and may be installed in any convenient location in the aircraft. The location and installation will vary with each particular type of aircraft; however, consideration should be given to the following general requirements when planning the installation:

The available installation area and dimensions of the unit. Compare the space requirements shown in the outline dimension drawing, Figure 2–1, with the area being considered.

Location. Locate the T-25A and its associated units so that they are accessible for inspection and maintenance, and in an area reasonably free from vibration, with sufficient clearance for sway and ventilation.

Interconnecting cables. Keep the interconnecting cables (especially the antenna cables) to minimum lengths. Leave enough space to facilitate making cable connections, and arrange each cable so that shock-mount travel is not restricted. Do not make sharp bends in any of the cables, and do not run cables where they may be subjected to excessively high temperatures, such as may exist adjacent to heaters or engine exhausts.

2–4. INSTALLATION.

Mounting. The T-25A Transmitter is designed for installation, alone or with other ARC modular units, in an ARC Series 40 Mounting. Figure 2–1 shows the outline dimensions for a single-unit installation using an ARC Type M-41A Mounting. Figure 2–2 shows the installation dimensions for the M-41A alone. For multiple-unit installation, refer to the ARC Series 40 Mounting instruction book. To install the M-41A Mounting, proceed as follows:

Step 1. Drill the aircraft mounting surface for eight No. 6 binding-head screws, located as shown in Figure 2–2. The mounting surface should be clean, bare metal to insure proper grounding of the unit.

Note

The bottom plate of the M-41A may be used as a template for locating the mounting holes.

Step 2. Insert the screws through the eyelets attaching the shock mounts to the lower plate, and place the M-41A in position. Secure with nuts and lockwashers.

T-25A Transmitter. Before installing the T-25A Transmitter on the M-41A Mounting, the following steps must be completed:

Step 1. Mount Connector ARC-21983 in the normal-low (N3) position on Plate ARC-22287 as shown in Figure 2–3. These items and the mounting hardware required are supplied in Connector Kit ARC-22366 furnished with the T-25A Transmitter.

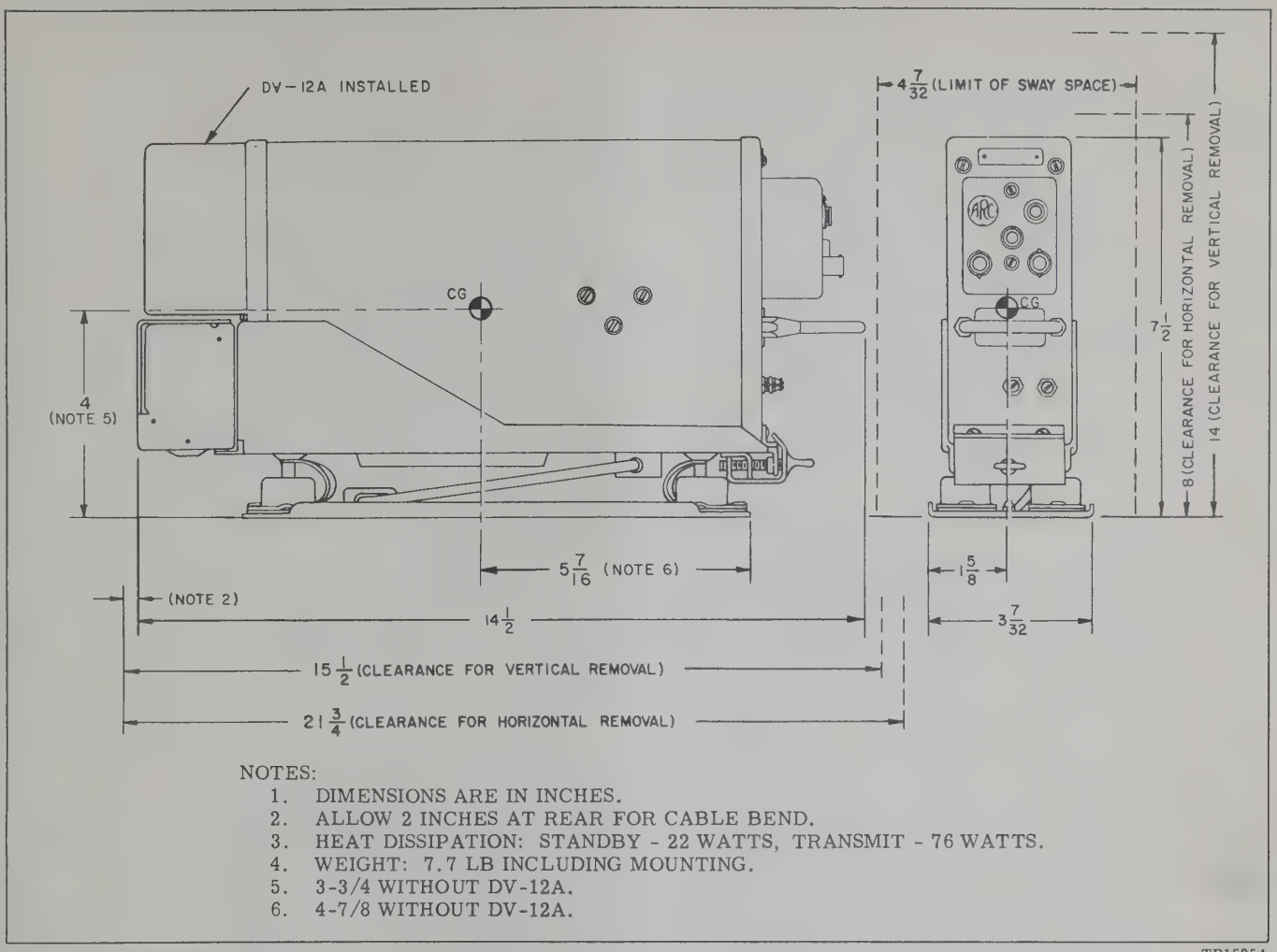
Step 2. Solder connector contacts to the wires to be terminated in the connector. Do not get solder on the outside of the contacts. Insert each wired contact in the proper hole in the rear of the connector block. Make sure that each contact is seated.

Note

Contacts are supplied loose in the connector kit. Contacts for holes designated with letters are larger than for those designated with numbers. To remove contacts from connector block, use Contact Removing Tools ARC-22001 and ARC-22002. If desired, connector block may be used as a holding fixture by inserting contacts part way before soldering wires to them.

Step 3. Remove the top cover of the coupling box (part of M-41A Mounting) and release the cable clamp.

Step 4. Attach the wired connector and the plate assembly to the inside front face of the coupling box as


DV-12A INSTALLED
CG
4 (NOTE 5)
5 7/16 (NOTE 6)
(NOTE 2)
14 1/2
15 1/2 (CLEARANCE FOR VERTICAL REMOVAL)
21 3/4 (CLEARANCE FOR HORIZONTAL REMOVAL)
4 7/32 (LIMIT OF SWAY SPACE)
7 1/2
8 (CLEARANCE FOR HORIZONTAL REMOVAL)
14 (CLEARANCE FOR VERTICAL REMOVAL)
1 5/8
3 7/32
NOTES:
1. DIMENSIONS ARE IN INCHES.
2. ALLOW 2 INCHES AT REAR FOR CABLE BEND.
3. HEAT DISSIPATION: STANDBY - 22 WATTS, TRANSMIT - 76 WATTS.
4. WEIGHT: 7.7 LB INCLUDING MOUNTING.
5. 3-3/4 WITHOUT DV-12A.
6. 4-7/8 WITHOUT DV-12A.

TP1525A

Figure 2–1. T-25A Transmitter and M-41A Mounting, Outline Dimensions

shown in Figure 2–3. Arrange the cable wires so that they will not pull on the connector contacts when the cable clamp is tightened. Replace the cable clamp and secure the wires by tightening the cable clamp screws. Replace the top cover of the coupling box.

Step 5. Place the coupling box on the rear of the M-41A Mounting and secure with snapslides at the rear of the tray.

Step 6. To terminate the antenna cables which connect to the front panel connectors of the T-25A, use the two UG-88C/U connectors supplied (see Figure 2–4).

To install the T-25A on the M-41A, proceed as follows:

Step 1. Loosen the adjustable mounting flange thumbscrew on the front of the M-41A.

Step 2. Slide the T-25A on the M-41A so that its connector fully engages the mating connector at the rear of the mounting.

Step 3. Tighten the thumbscrew until the adjustable mounting flange firmly engages the T-25A front panel bracket.

DV-12A Dynaverter. To install a DV-12A on the T-25A, proceed as follows:

Step 1. Remove the T-25A dust cover.

Step 2. Remove plug assembly P104 from J110, located at the rear of the T-25A chassis.

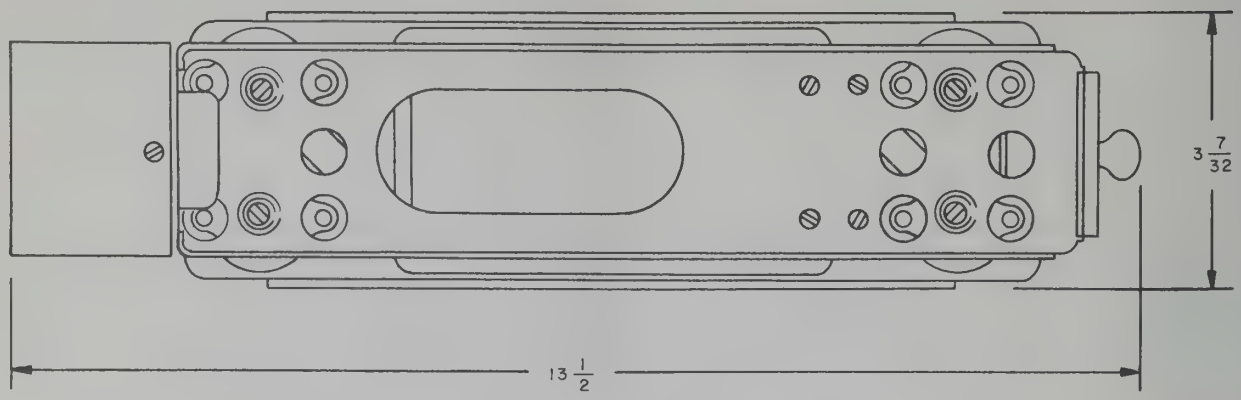
Step 3. Plug the DV-12A into J110 of the T-25A. Using a long, narrow-shank screwdriver, fasten the DV-12A to the T-25A with four captive screws on the DV-12A.

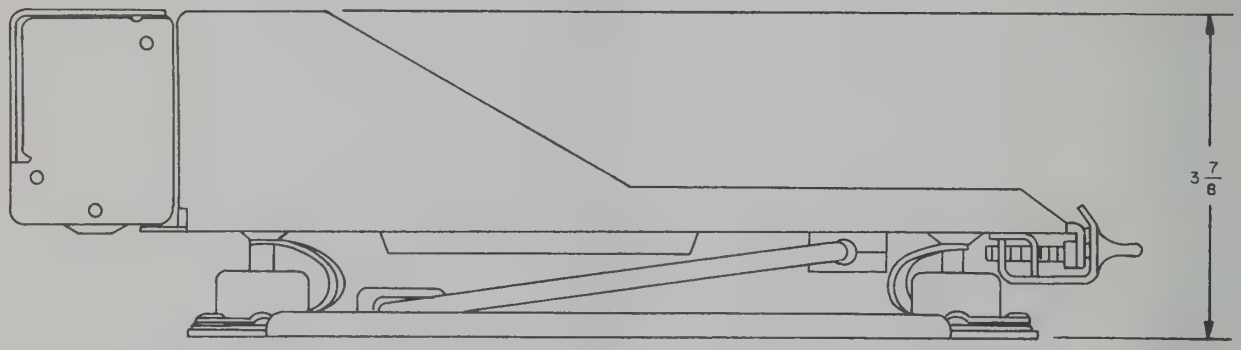
Step 4. Replace the T-25A dust cover.

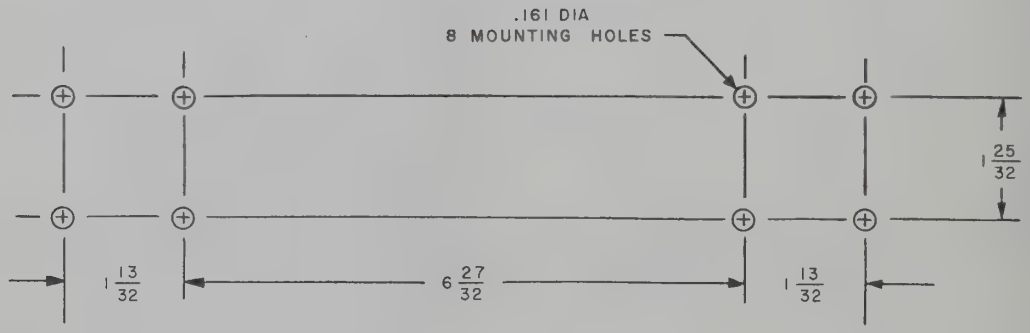
Caution

Be sure to replace all attaching screws when reinstalling the dust cover. These screws must be in place for adequate heat dissipation.

Step 5. Remove the protective backing from the adhesive-coated nameplate provided with the DV-12A. Install the nameplate on the top front surface of the T-25A dust cover.



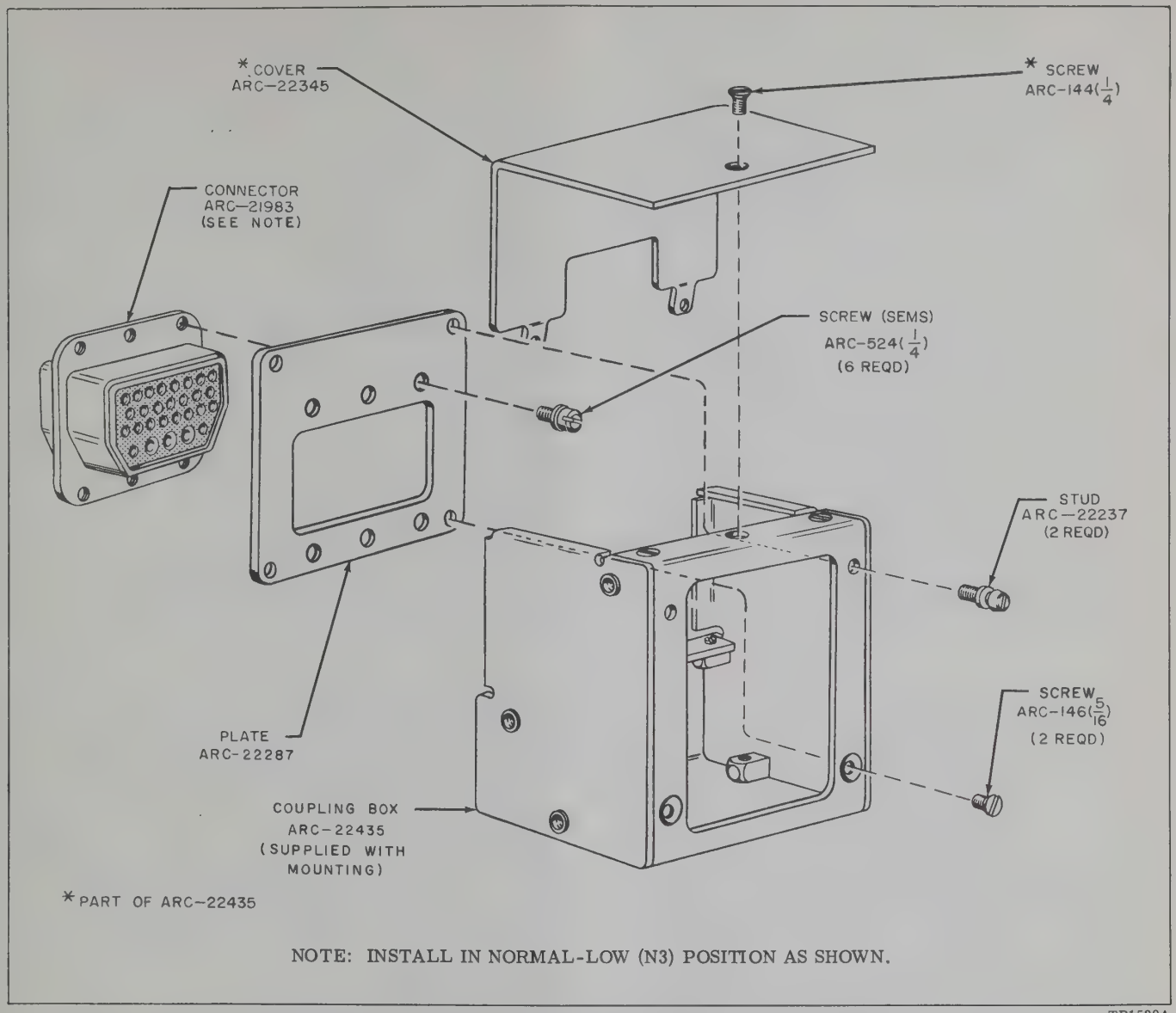




NOTES:
1. DIMENSIONS ARE IN INCHES.
2. WEIGHT: 1.4 LB.

Figure 2–2. M-41A Mounting, Installation Dimensions

TP1657



TP1529A

Figure 2–3. Assembly of Connector, Plate, and Coupling Box

C-82A Control Unit. Outline dimensions for the C-82A Control Unit are shown in Figure 2–5. The C-82A is designed for installation on a standard AN console panel and is secured by four Dzus fasteners.

Channel Selector Switch Assemblies. Either Channel Selector Switch ARC-20730 or ARC Type CC-10A Custom Control Unit may be used in place of the C-82A Control Unit. Installation dimensions and assembly details for the channel selector switch assemblies are shown in Figures 2–6 and 2–7, and 2–8 and 2–9, respectively.

2–5. ASSOCIATED UNITS.

The T-25A Transmitter may be used with an ARC Type R-15 (108–135 mc) or ARC Type R-19 (118–148 mc) VHF Receiver to make a complete two-way vhf communication system. The T-25A Transmitter may also be used with an ARC Type R-13B or R-32 Receiver to form a supplementary vhf communication system (see Figure 2–14). The R-13B and R-32 Receivers are part of the ARC Type 15D and 15E VHF Navigation Equipments, respectively. The T-25A may also be used with the ARC Type R-34A Receiver, which is part of the ARC Type 15F VHF Navigation Equipment (see Figure 2–15). The DV-12A Dynaverter, installed on the rear of the T-25A; or the DV-10A Dynaverter, DV-11A Dynaverter, or D-10A Dynamotor, installed on the associated receiver or ARC Type P-12 Power Unit, is used to supply the necessary plate and screen voltages for the transmitter.

To select the transmitting frequency, a C-82A Control Unit, or a Channel Selector Switch Assembly ARC-20730 or an ARC Type CC-10A Custom Control Unit is required. When any of these controls is used, an addi-

tional control unit, such as an ARC Type C-65 Control Unit, is required to tune the associated receiver. The channeling systems using the C-82A and the alternative switch assemblies are shown in Figures 2–10 and 2–11, respectively. Figure 2–12 shows the interconnections required for a T-25A Transmitter, a DV-12A Dynaverter, and a C-82A Control Unit. A typical installation of an R-19 Receiver and T-25A Transmitter, with an ARC Type F-11A Isolation Amplifier, is shown in Figure 2–13.

If the optional feature of SCS-DCS operation [1] is desired, Rotary Switch ARC-20332, or equivalent, is added to the channeling system installation, as shown in Figure 2–16. With this type of installation, however, the operator must remember to set the SCS-DCS switch to SCS before pressing the receiver tuning crank for whistle-through operation. For SCS-DCS operation, with automatic channeling for whistle-through during DCS (DCS reverts to SCS operation when whistle-through switch is pressed), the rotary switch is replaced by the relay and toggle switch circuit shown in Figures 2–13 and 2–14.

2–6. INSTALLATION ADJUSTMENTS.

The tuning of the T-25A Transmitter is fully automatic and no tuning adjustments are required prior to placing it in operation. However, a ground check of transmission on several channel frequencies should be made with the aircraft engines running and all electrical equipment operating normally. During these tests, adjust the SIDETONE control (and the WHISTLE LEVEL control if a manually tuned receiver is used) on the front panel of the T-25A as follows:

Step 1. Loosen the SIDETONE control locknut. With the T-25A operating in the transmit condition, and with the receiver audio output terminated in the normal audio load presented by the individual installation, adjust the SIDETONE control to obtain the sidetone level desired by the operator. Tighten the locknut, being careful not to disturb the setting of the control.

Step 2. Loosen the WHISTLE LEVEL control locknut. Set the receiver VOL control to its maximum clockwise position. Set a Simpson Model 260 Multimeter (or equivalent 20,000 ohms-per-volt voltmeter) to read 10 volts ac full scale, and connect it across the receiver audio output terminated in the normal audio load presented by the individual installation.

Step 3. Select any one of the T-25A transmitting frequencies. Press the tuning crank and tune the receiver in the vicinity of the selected transmitting frequency for maximum whistle.

Step 4. Adjust the WHISTLE LEVEL control for a 1-volt output reading on the a-c voltmeter. An alternative method is to arbitrarily adjust the WHISTLE LEVEL control for a minimum-usable whistle level on all operating frequencies.

Step 5. Tighten the WHISTLE LEVEL control locknut without disturbing the control setting.

2–7. R-F OUTPUT CHECK.

Note

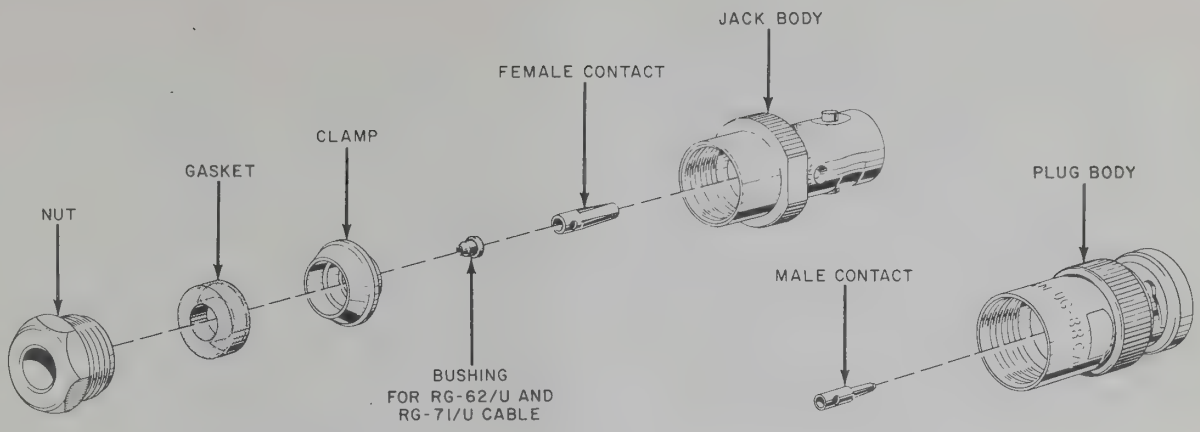
This check is only an indication of r-f output and should not be used as a substitute for a standard r-f wattmeter test.

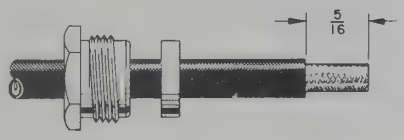
To check for the presence of r-f output at the TEST jack of the T-25A, the ANT connector must be connected either to its proper antenna or to a 52-ohm dummy load, 10 watts minimum. Proceed as follows:

Step 1. Set a Simpson Model 260 Multimeter (or equivalent 20,000 ohms-per-volt voltmeter) to read 50 volts dc full scale, and connect it between the T-25A front panel TEST jack and ground.

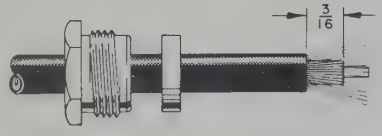
Step 2. Select any one of the T-25A transmitting frequencies. Close the microphone switch and observe the reading on the voltmeter. The meter should read at least 15 volts dc for any frequency setting, indicating the presence of r-f output at the ANT connector of the T-25A.

[1] For SCS (single-channel simplex) operation, the receiver and transmitter operate on the same frequency; for DCS (double-channel simplex) operation, the transmitter operates 6.0 mc above the receiving frequency.

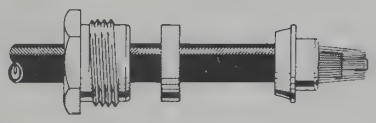




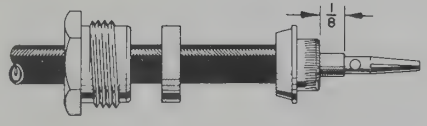
PLACE NUT AND GASKET OVER CABLE AND TRIM JACKET TO DIMENSION SHOWN. UNGROOVED FACE OF GASKET MUST BE TOWARD NUT.



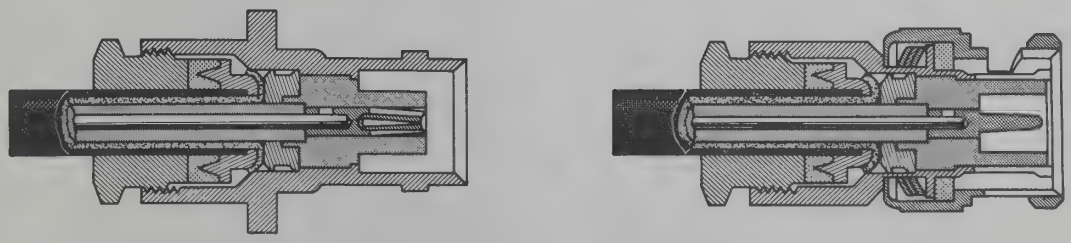
COMB OUT BRAID AND CUT CABLE DIELECTRIC TO DIMENSION SHOWN, BEING CAREFUL NOT TO NICK CENTER CONDUCTOR. TIN CENTER CONDUCTOR.



PULL BRAID WIRES FORWARD AND TAPER TOWARD CENTER CONDUCTOR. PLACE CLAMP OVER BRAID AND PUSH AGAINST CABLE JACKET.



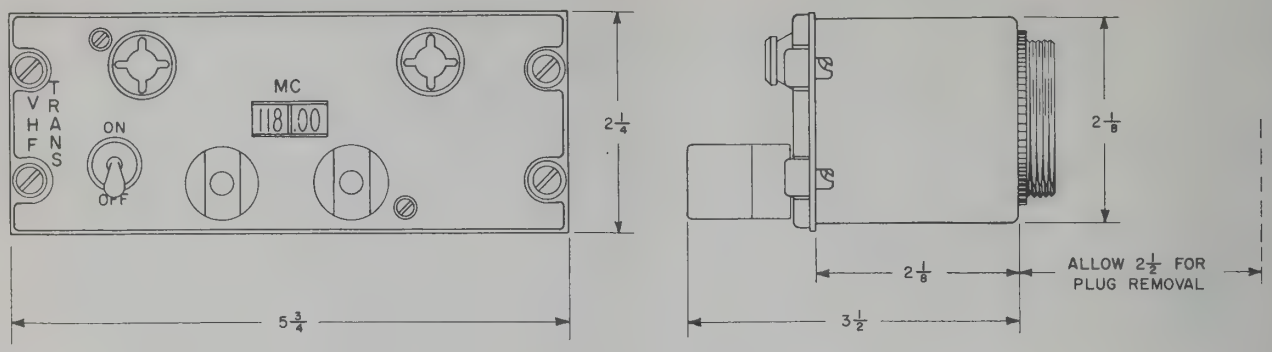
FOLD BACK BRAID WIRES AS SHOWN, TRIM TO PROPER LENGTH, AND FORM OVER CLAMP AS SHOWN. FOR RG-62/U AND RG-71/U CABLE, SLIP BUSHING OVER CENTER CONDUCTOR AND UNDER DIELECTRIC. SOLDER CONTACT TO CENTER CONDUCTOR.



INSERT CABLE AND PARTS INTO CONNECTOR BODY. MAKE SURE SHARP EDGE OF CLAMP SEATS PROPERLY IN GASKET. TIGHTEN NUT.

Figure 2–4. Fabrication of Antenna Cable Assembly

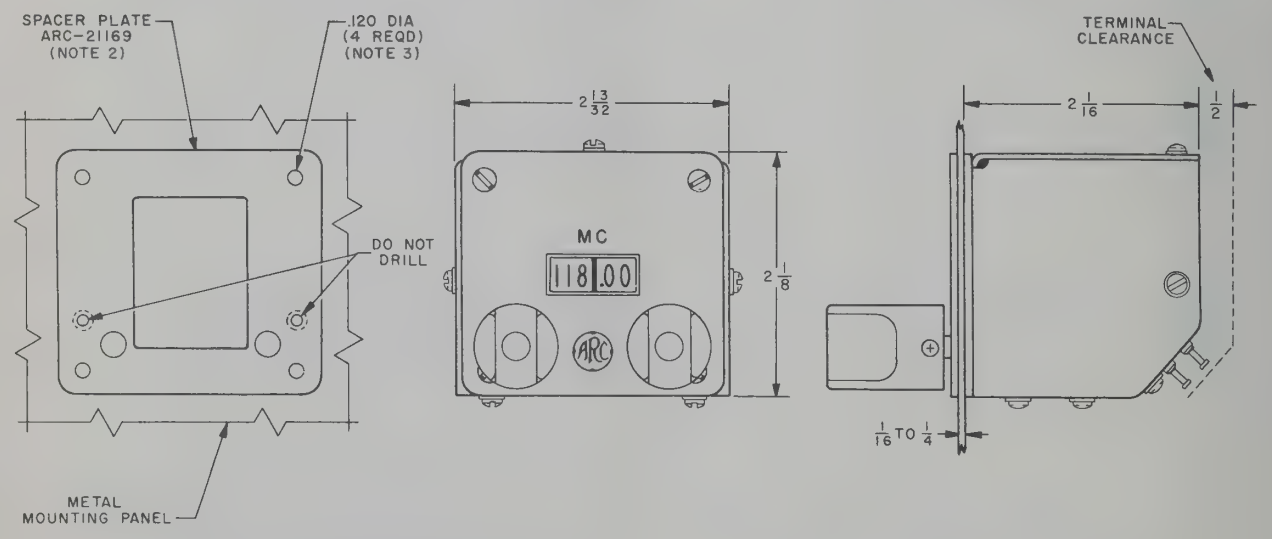
TP1731



NOTES:
1. DIMENSIONS ARE IN INCHES.
2. HEAT DISSIPATION: 2.5 WATTS.
3. WEIGHT: 1.2 LB.

TP1531

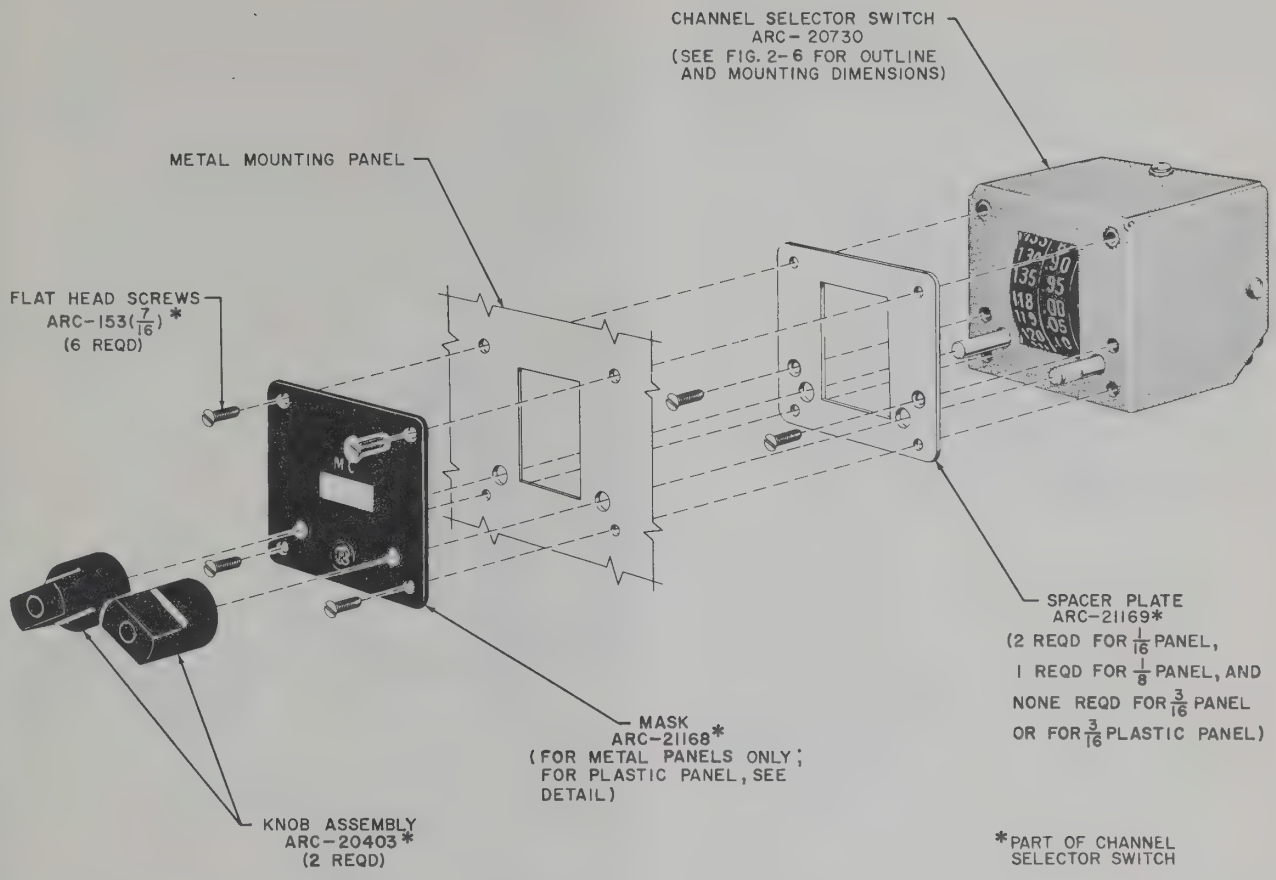
Figure 2–5. C-82A Control Unit, Outline Dimensions

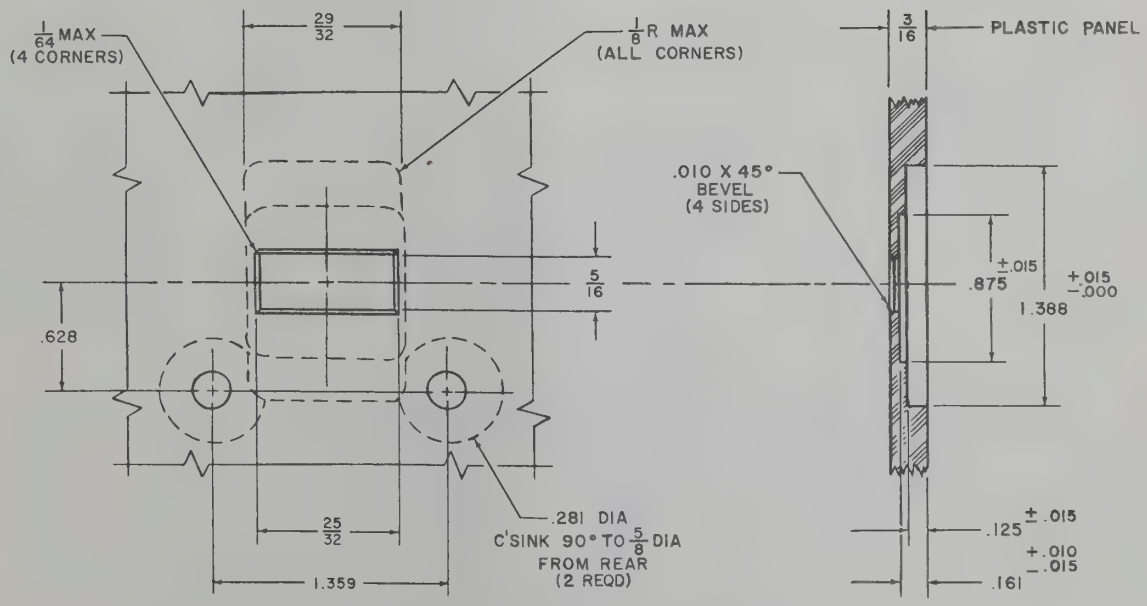


NOTES:
1. DIMENSIONS ARE IN INCHES.
2. FOR LAYOUT, USE ARC-21169 SPACER PLATE AS TEMPLATE.
3. IF 3/16-INCH PLASTIC PANEL IS USED, COUNTERSINK HOLES 82° IN METAL MOUNTING PANEL TO .223 DIAMETER.

TP1533

Figure 2–6. Channel Selector Switch ARC-20730, Installation Dimensions



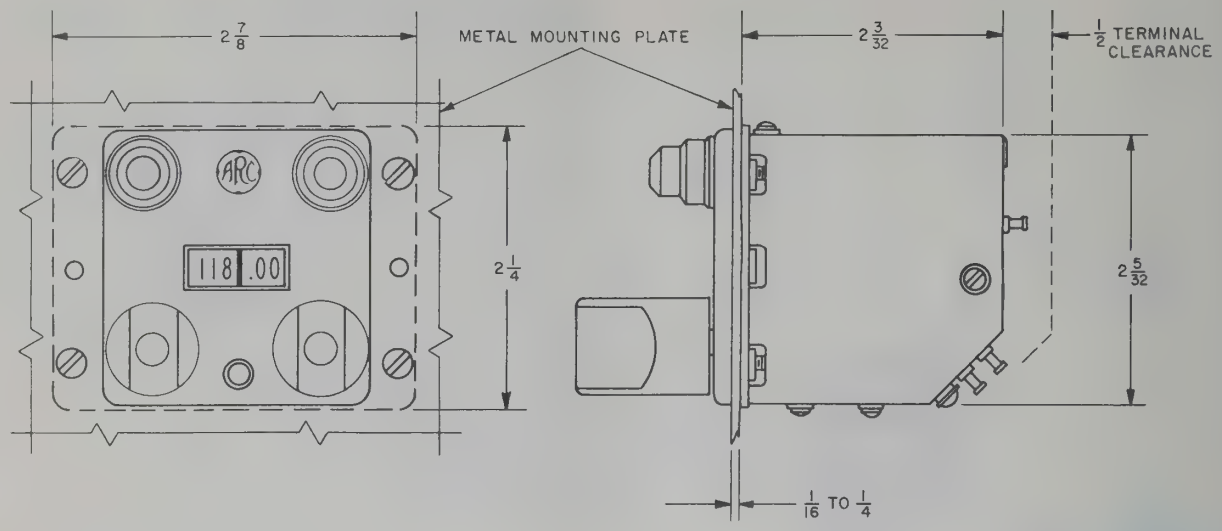


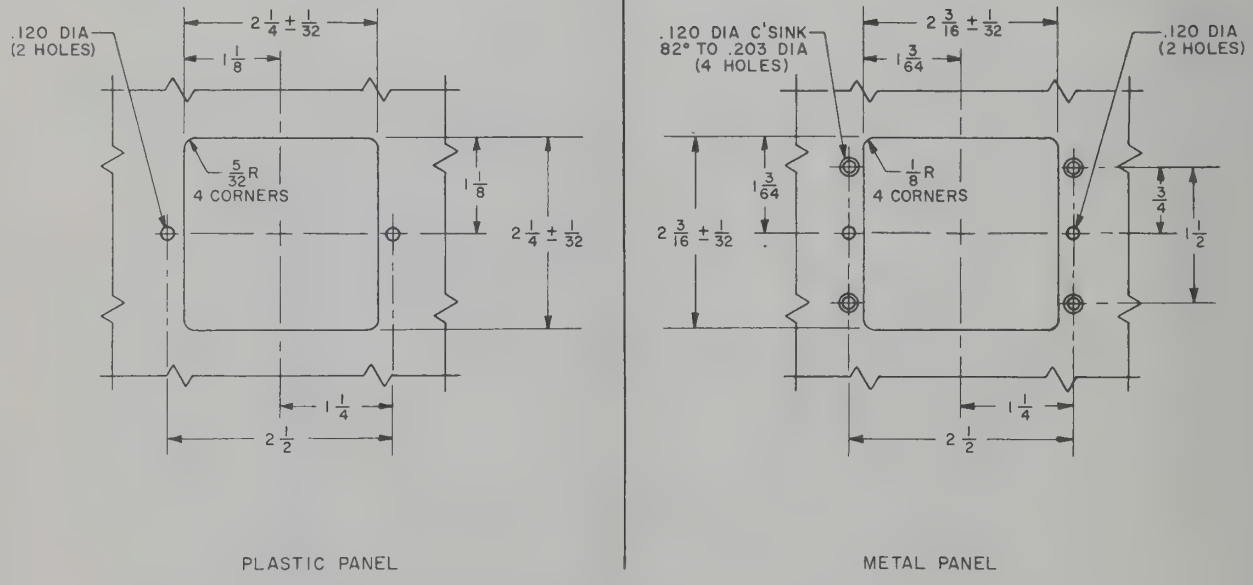
PLASTIC PANEL DETAIL

NOTE: DIMENSIONS ARE IN INCHES.

Figure 2–7. Channel Selector Switch ARC-20730, Assembly Details

TP1535A

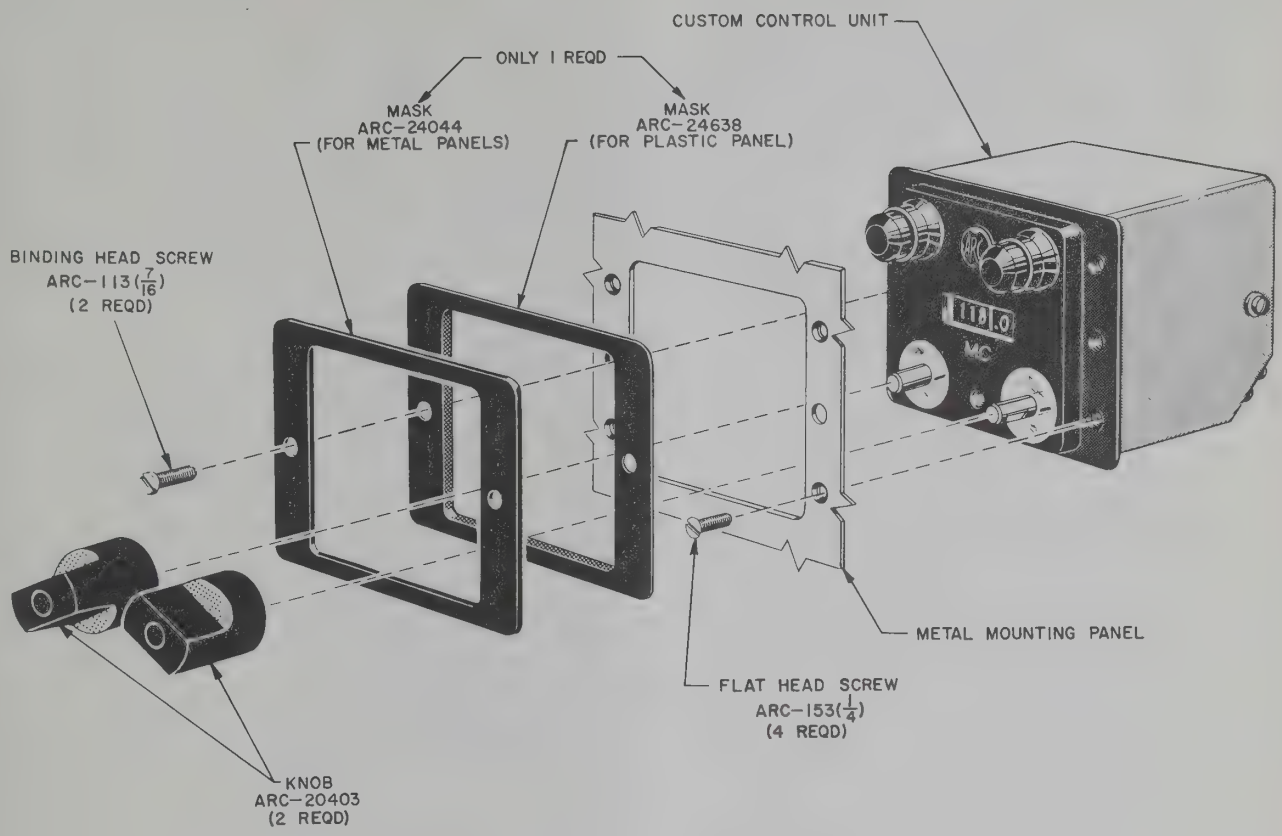




NOTE: DIMENSIONS ARE IN INCHES.

Figure 2–8. CC-10A Custom Control Unit, Installation Dimensions

TP1755



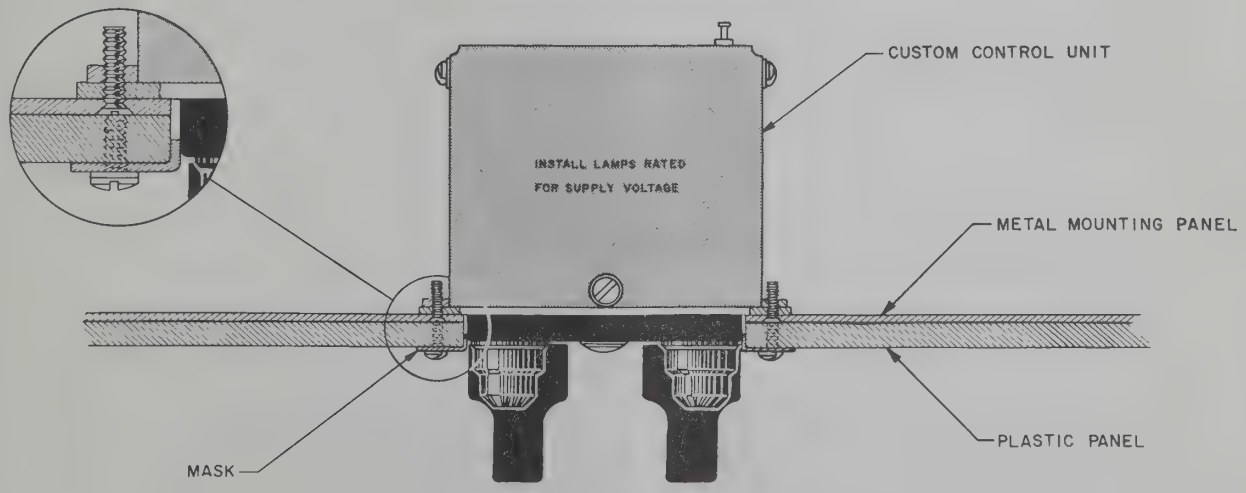
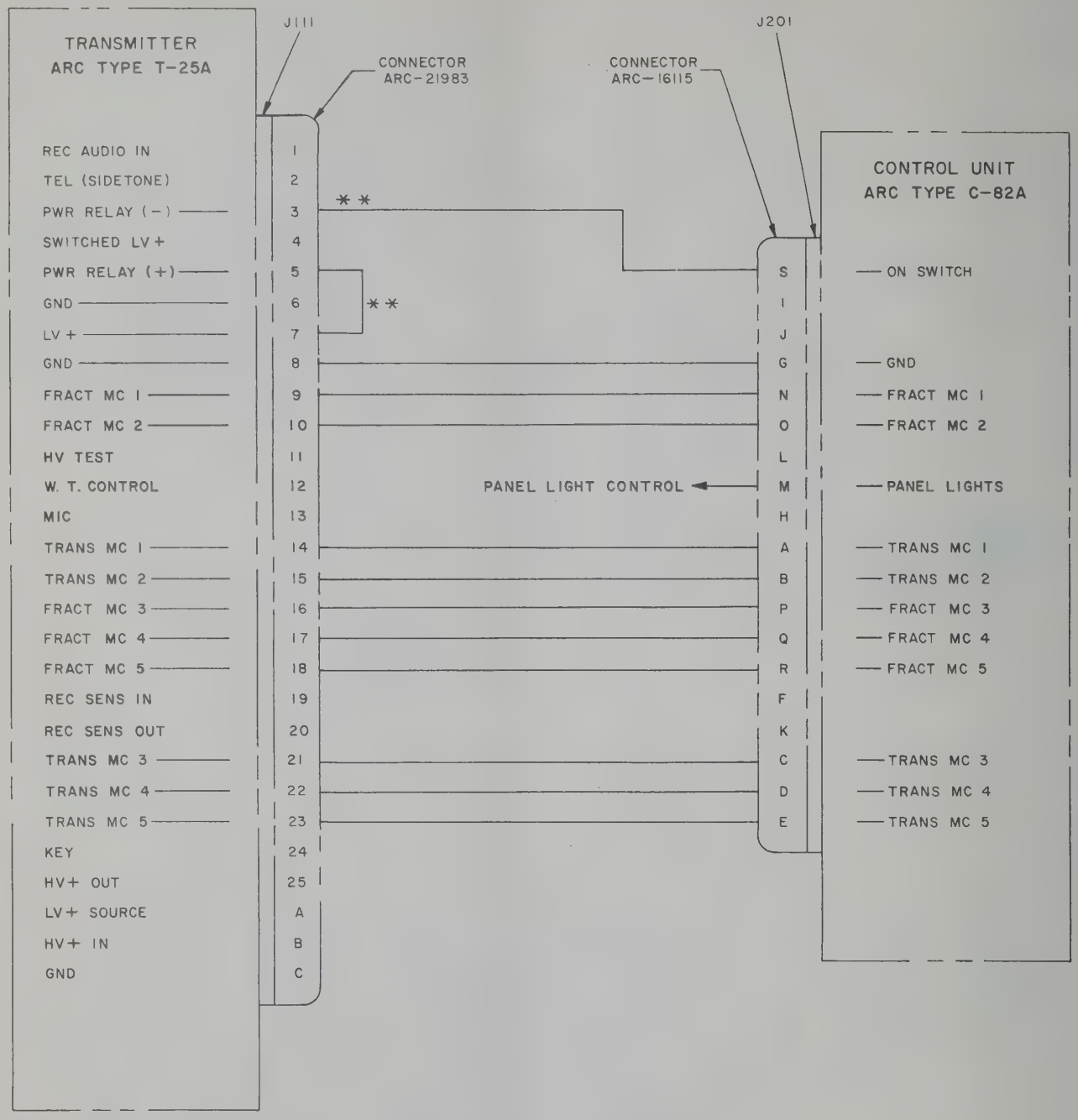


Figure 2–9. CC-10A Custom Control Unit, Assembly Details

TP1757



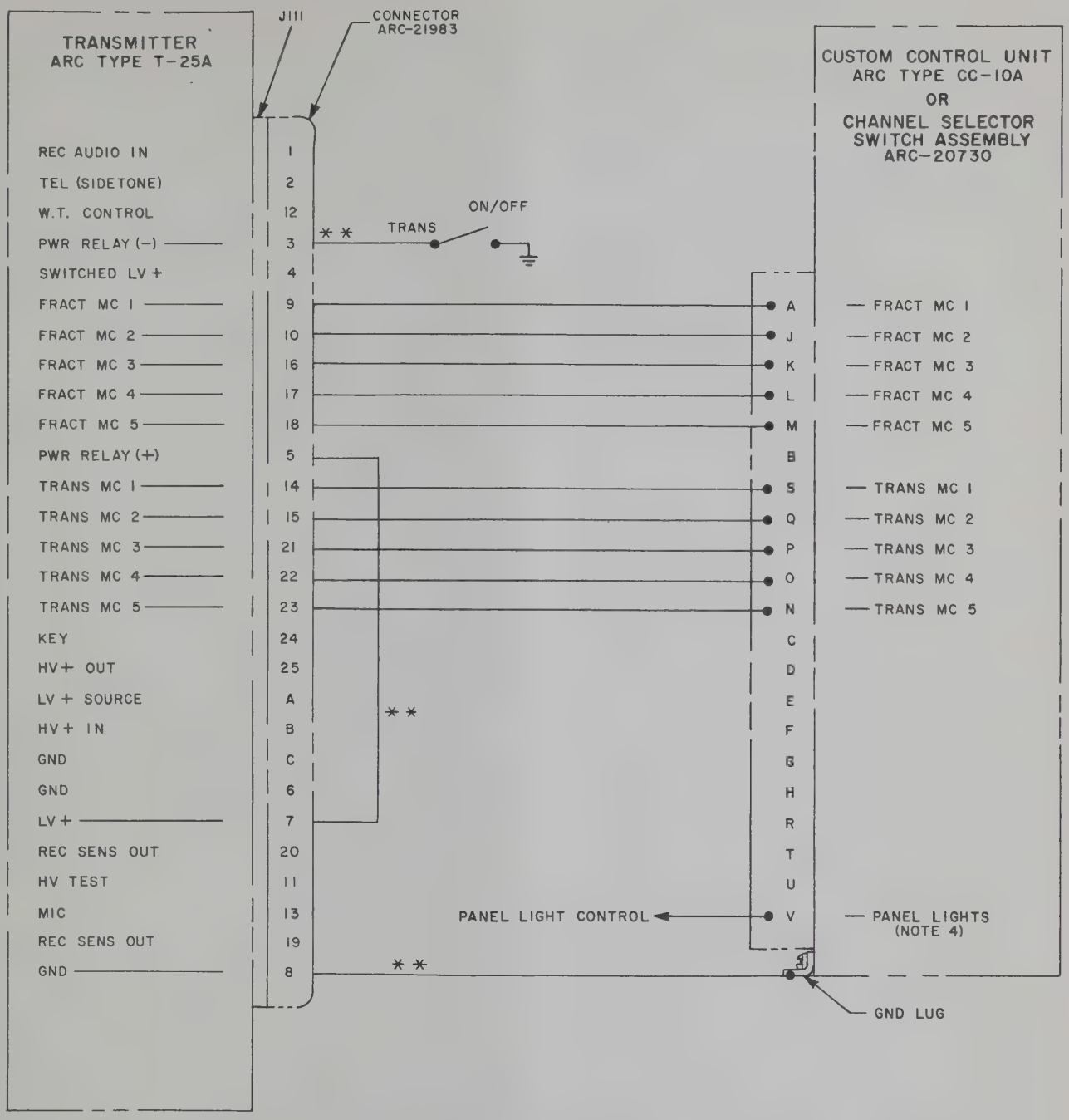
NOTES:

1. WIRES ARE #20 STRANDED COPPER, EXCEPT WHERE OTHERWISE NOTED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE OF SUFFICIENT SIZE (#16 MINIMUM) TO PROVIDE LESS THAN 0.5-VOLT DROP BETWEEN EQUIPMENT AND SOURCE.

2. FOR COMPLETE SYSTEM DIAGRAMS, SEE FIGURES 2-13, 2-14, AND 2-15.

Figure 2–10. T-25A Transmitter and C-82A Control Unit, Interconnection Diagram

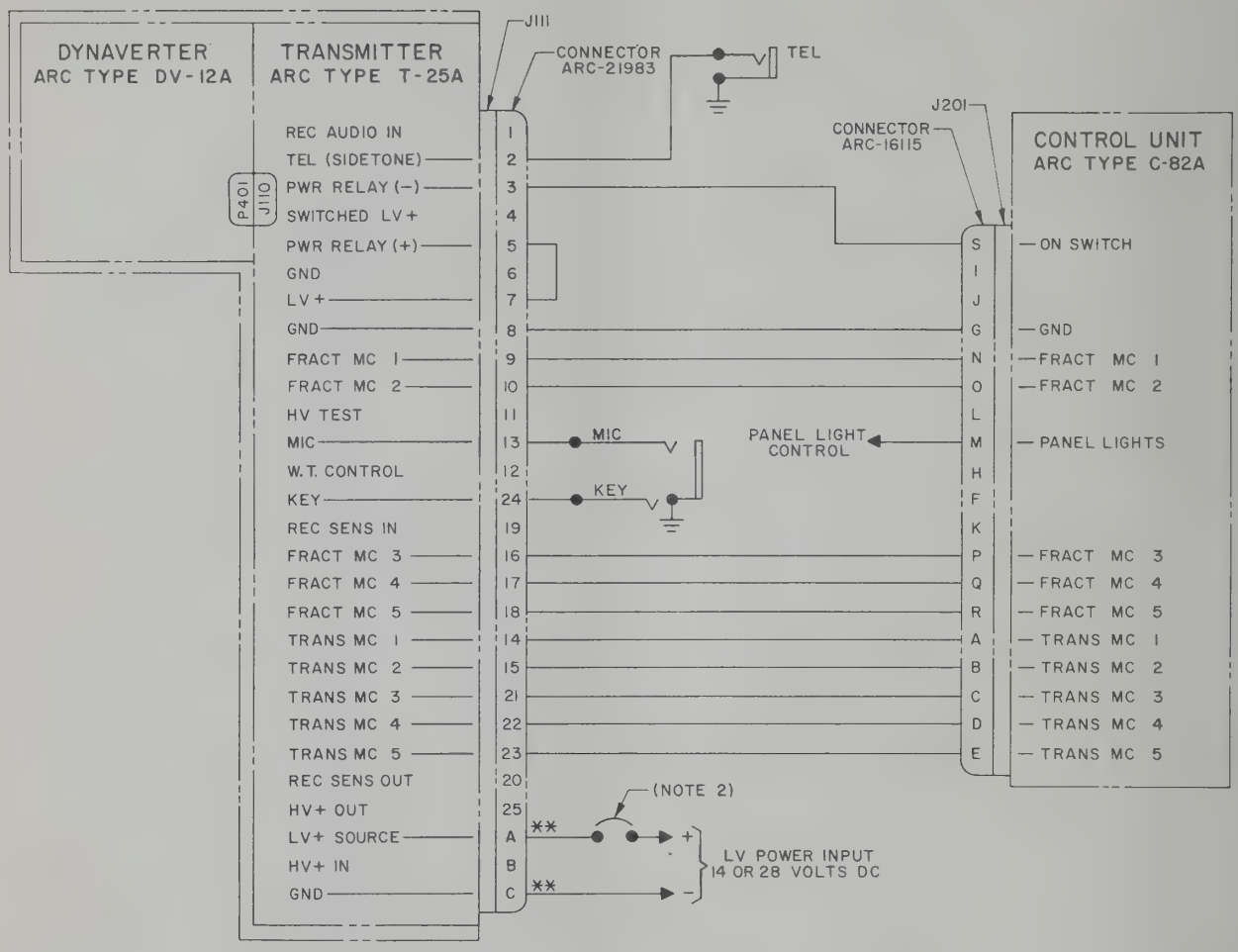
22794A



NOTES:

1. IF SCS-DCS OPERATION IS DESIRED, SEE FIGURES 2-13, 2-14, AND 2-16.
2. FOR COMPLETE SYSTEM DIAGRAMS, SEE FIGURES 2-13, 2-14, AND 2-15.
3. WIRES ARE #20 STRANDED COPPER, EXCEPT WHERE OTHERWISE NOTED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE OF SUFFICIENT SIZE (#16 MINIMUM) TO PROVIDE LESS THAN 0.5-VOLT DROP BETWEEN EQUIPMENT AND SOURCE.
4. USED ON ARC TYPE CC-10A CUSTOM CONTROL UNIT ONLY.

Figure 2–11. T-25A Transmitter and CC-10A Custom Control Unit, Interconnection Diagram 22796B

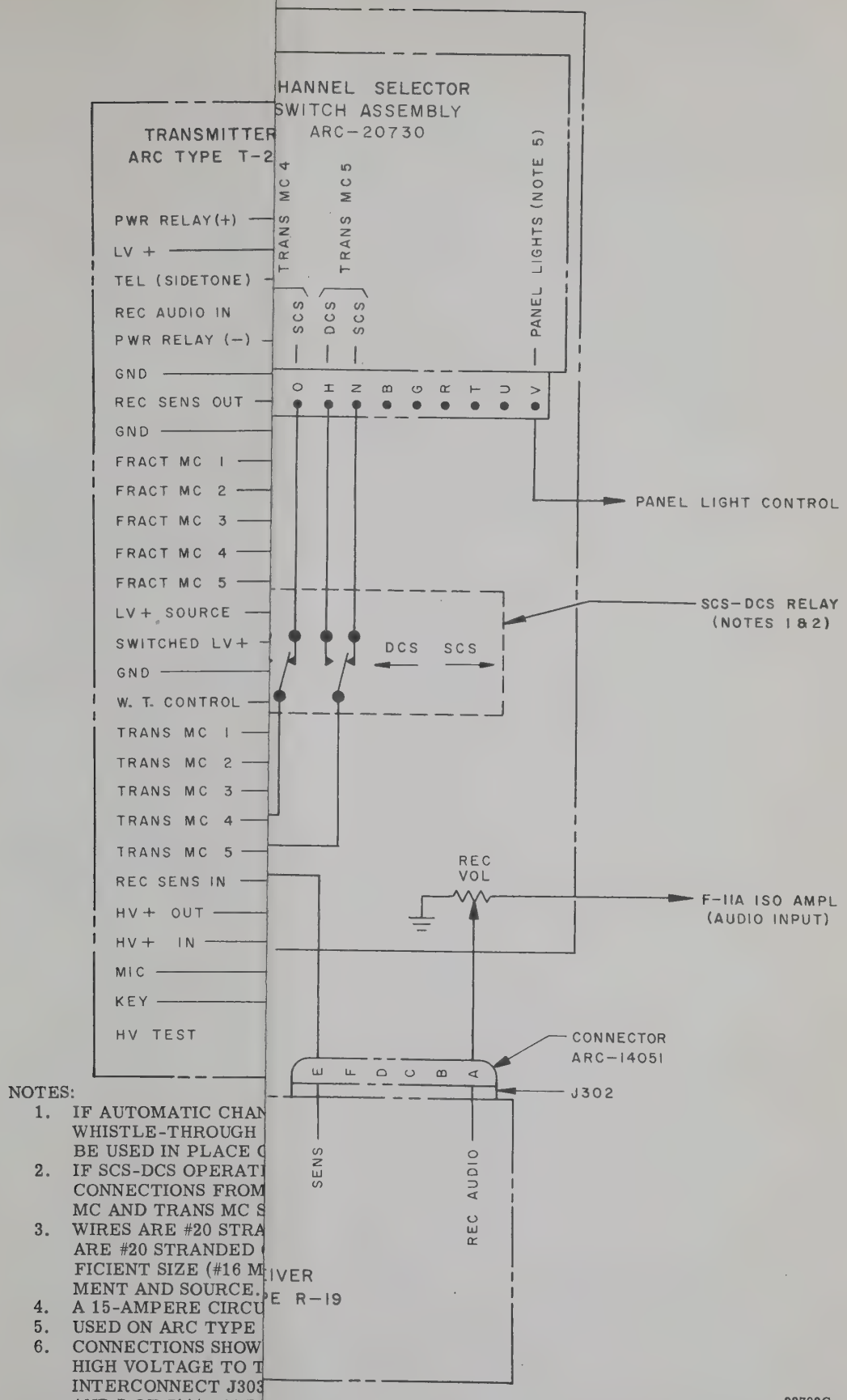


NOTES:

1. WIRES ARE #20 STRANDED COPPER, FIBROUS-GLASS INSULATED, UNLESS OTHERWISE NOTED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE OF SUFFICIENT SIZE (#16 MINIMUM) TO PROVIDE LESS THAN 0.5-VOLT DROP BETWEEN EQUIPMENT AND SOURCE.

2. A 15-AMPERE CIRCUIT BREAKER (NOT SUPPLIED) IS RECOMMENDED FOR CIRCUIT PROTECTION.

Figure 2–12. T-25A Transmitter, DV-12A Dynaverter, and C-82A Control Unit, Interconnection Diagram 23838A

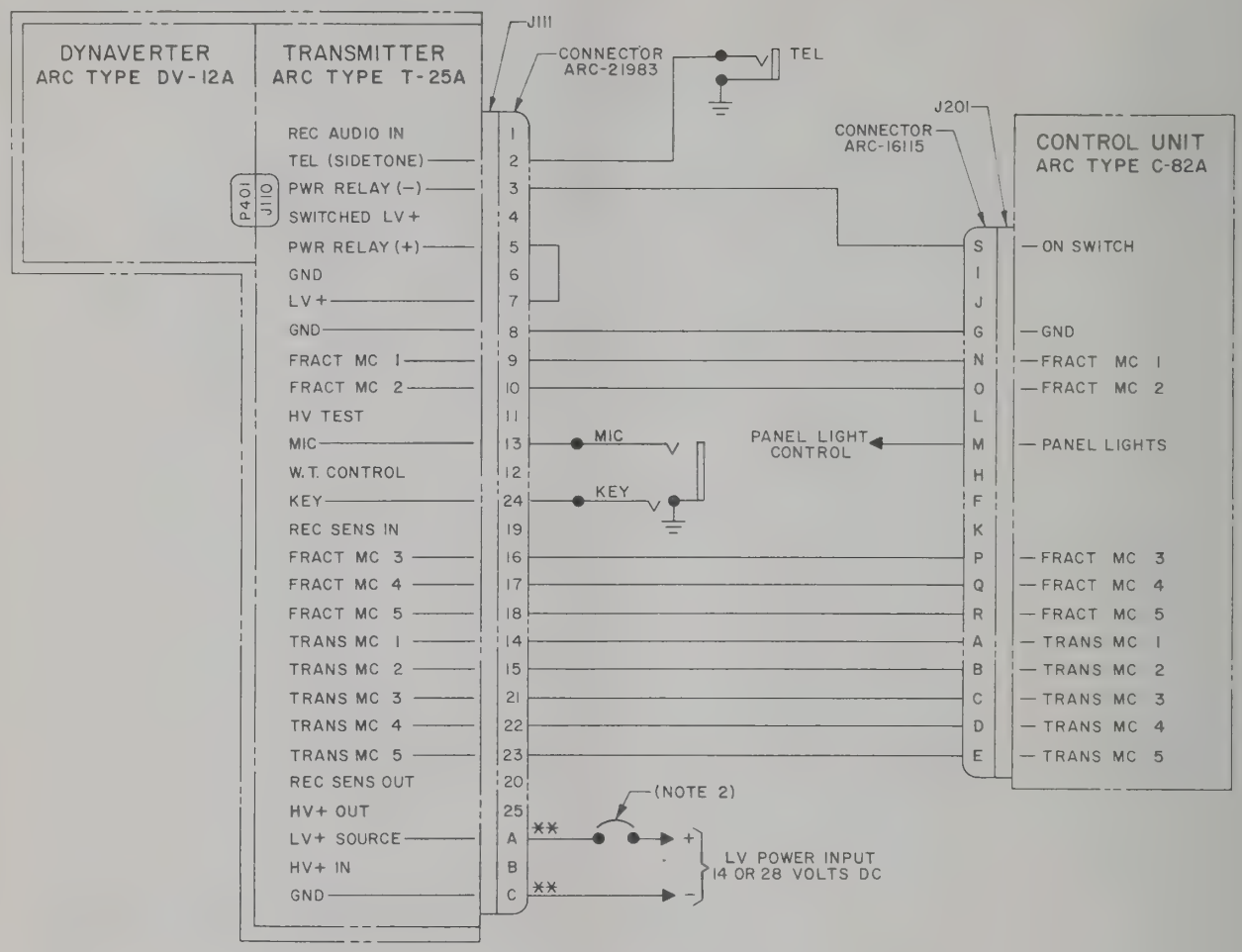


NOTES:

1. IF AUTOMATIC CHAN
   WHISTLE-THROUGH
   BE USED IN PLACE C
2. IF SCS-DCS OPERATI
   CONNECTIONS FROM
   MC AND TRANS MC S
3. WIRES ARE #20 STRA
   ARE #20 STRANDED
   FICIENT SIZE (#16 M
   MENT AND SOURCE.
4. A 15-AMPERE CIRCU
5. USED ON ARC TYPE
6. CONNECTIONS SHOW
   HIGH VOLTAGE TO T
   INTERCONNECT J303
   AND 7 OF J111, AND

22792C

Figure 2–13. T-25A Transmitter, R-19 Receiver, and F-11A Isolation Amplifier, Interconnection Diagram

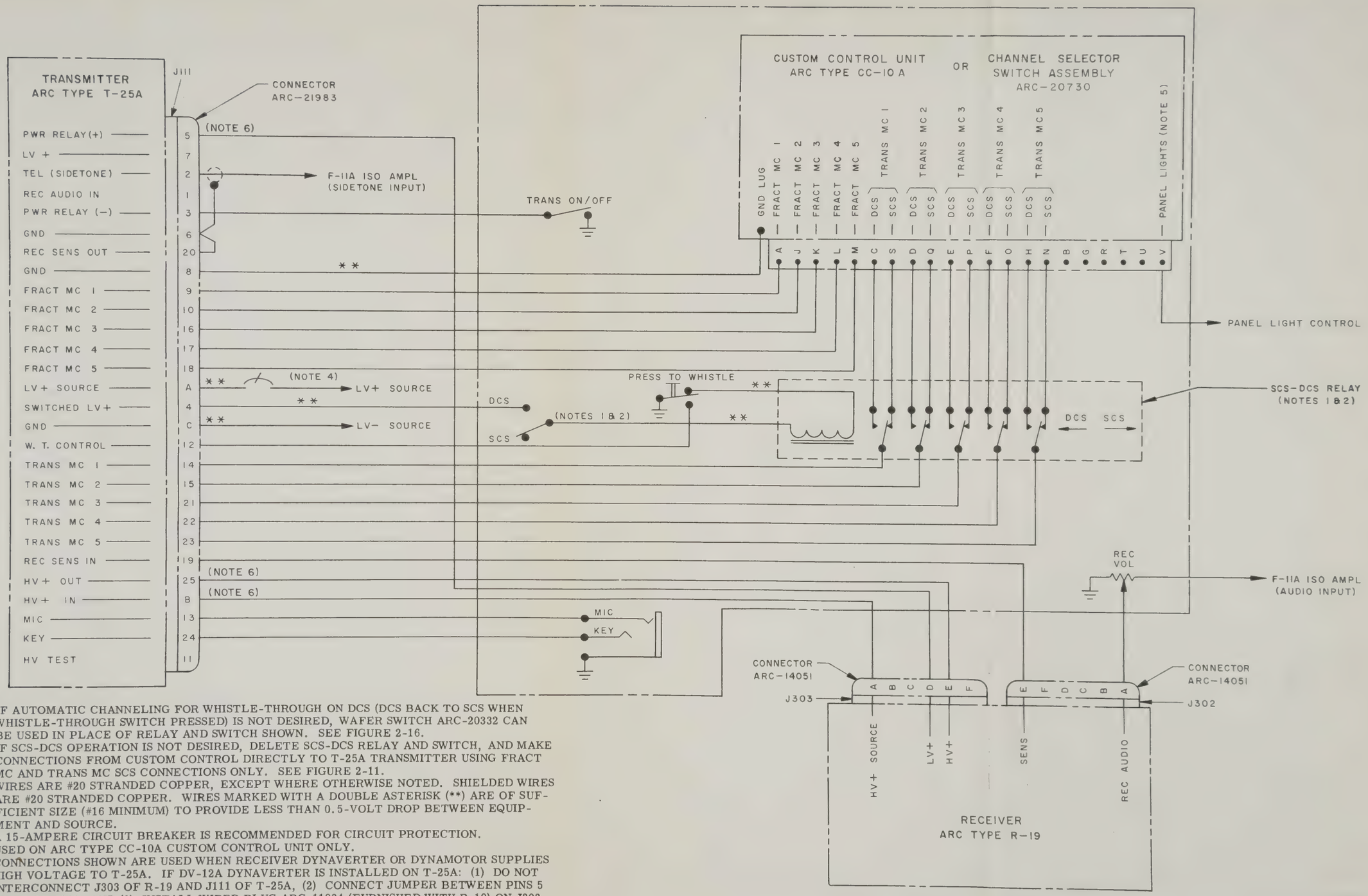


NOTES:

1. WIRES ARE #20 STRANDED COPPER, FIBROUS-GLASS INSULATED, UNLESS OTHERWISE NOTED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE OF SUFFICIENT SIZE (#16 MINIMUM) TO PROVIDE LESS THAN 0.5-VOLT DROP BETWEEN EQUIPMENT AND SOURCE.

2. A 15-AMPERE CIRCUIT BREAKER (NOT SUPPLIED) IS RECOMMENDED FOR CIRCUIT PROTECTION.

Figure 2–12. T-25A Transmitter, DV-12A Dynaverter, and C-82A Control Unit, Interconnection Diagram 23838A



NOTES:

1. IF AUTOMATIC CHANNELING FOR WHISTLE-THROUGH ON DCS (DCS BACK TO SCS WHEN WHISTLE-THROUGH SWITCH PRESSED) IS NOT DESIRED, WAFER SWITCH ARC-20332 CAN BE USED IN PLACE OF RELAY AND SWITCH SHOWN. SEE FIGURE 2-16.
2. IF SCS-DCS OPERATION IS NOT DESIRED, DELETE SCS-DCS RELAY AND SWITCH, AND MAKE CONNECTIONS FROM CUSTOM CONTROL DIRECTLY TO T-25A TRANSMITTER USING FRACT MC AND TRANS MC SCS CONNECTIONS ONLY. SEE FIGURE 2-11.
3. WIRES ARE #20 STRANDED COPPER, EXCEPT WHERE OTHERWISE NOTED. SHIELDED WIRES ARE #20 STRANDED COPPER. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE OF SUFFICIENT SIZE (#16 MINIMUM) TO PROVIDE LESS THAN 0.5-VOLT DROP BETWEEN EQUIPMENT AND SOURCE.
4. A 15-AMPERE CIRCUIT BREAKER IS RECOMMENDED FOR CIRCUIT PROTECTION.
5. USED ON ARC TYPE CC-10A CUSTOM CONTROL UNIT ONLY.
6. CONNECTIONS SHOWN ARE USED WHEN RECEIVER DYNAVERTER OR DYNAMOTOR SUPPLIES HIGH VOLTAGE TO T-25A. IF DV-12A DYNAVERTER IS INSTALLED ON T-25A: (1) DO NOT INTERCONNECT J303 OF R-19 AND J111 OF T-25A, (2) CONNECT JUMPER BETWEEN PINS 5 AND 7 OF J111, AND (3) INSTALL WIRED PLUG ARC-11934 (FURNISHED WITH R-19) ON J303.

22792C

Figure 2–13. T-25A Transmitter, R-19 Receiver, and F-11A Isolation Amplifier, Interconnection Diagram

NOTES:

1. IF AUTOMATIC CHANNELING FO
TO SCS WHEN WHISTLE-THROUG
WAFER SWITCH ARC-20332 CAN
SHOWN. SEE FIGURE 2-16.

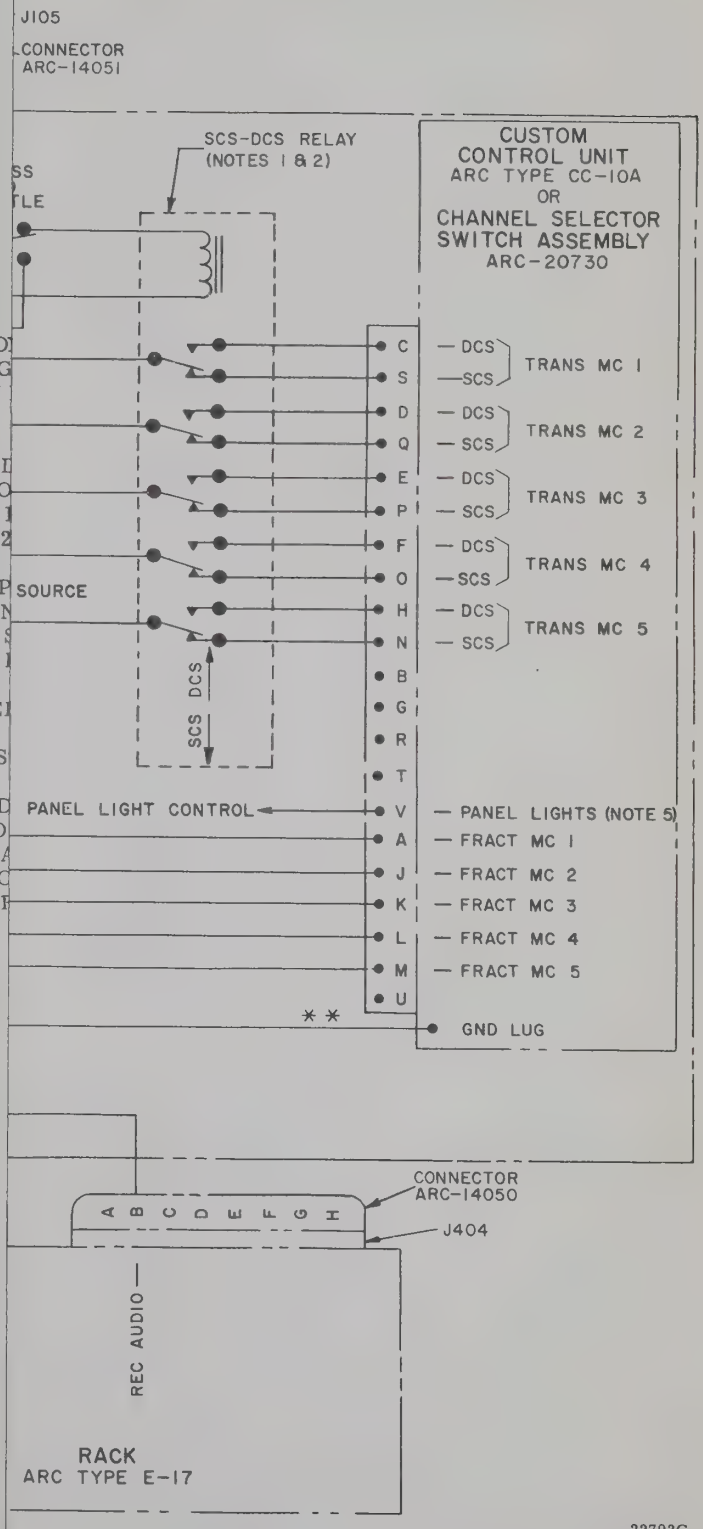
2. IF SCS-DCS OPERATION IS NOT I
SWITCH, AND MAKE CONNECTIO
TO T-25A TRANSMITTER USING I
NECTIONS ONLY. SEE FIGURE 2

3. WIRES ARE #20 STRANDED COPP
SHIELDED WIRES ARE #20 STRAN
DOUBLE ASTERISK (**) ARE OF S
PROVIDE LESS THAN 0.5-VOLT I

4. A 15-AMPERE CIRCUIT BREAKE

5. USED ON ARC TYPE CC-10A CUS

6. CONNECTIONS SHOWN ARE USED
DYNAMOTOR SUPPLIES HIGH VO
VERTER IS INSTALLED ON T-25A
R-32 AND J111 OF T-25A, (2) C
7 OF J111, AND (3) INSTALL WI
R-32) ON J105.



22793C

Figure 2–14. T-25A Transmitter and Type 15E VHF Navigation Equipment, Interconnection Diagram

NOTES:

1. IF AUTOMATIC CHANNELING FOR WHISTLE-THROUGH ON DCS (DCS BACK TO SCS WHEN WHISTLE-THROUGH SWITCH PRESSED) IS NOT DESIRED, WAFER SWITCH ARC-20332 CAN BE USED IN PLACE OF RELAY AND SWITCH SHOWN. SEE FIGURE 2-16.

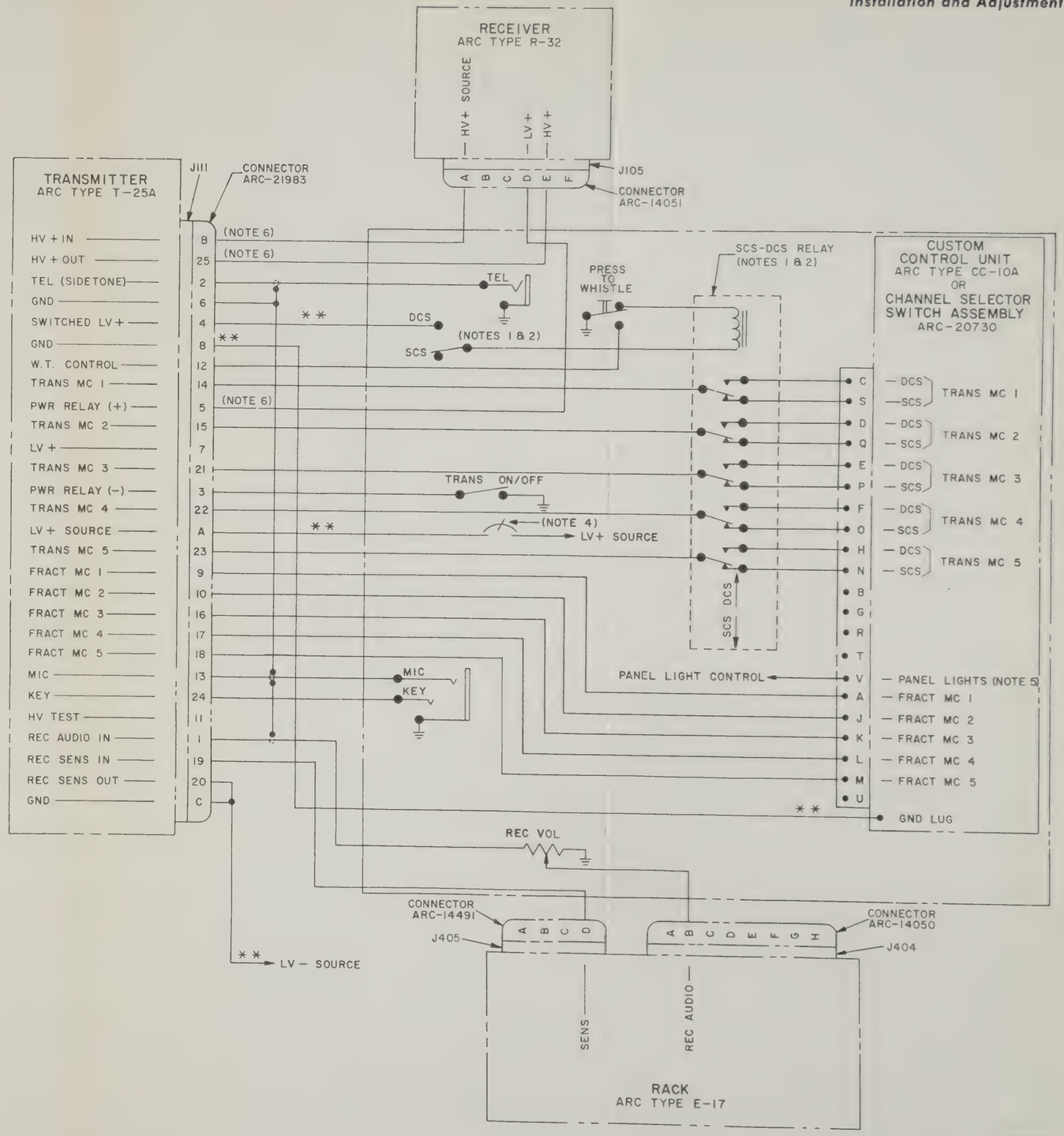
2. IF SCS-DCS OPERATION IS NOT DESIRED, DELETE SCS-DCS RELAY AND SWITCH, AND MAKE CONNECTIONS FROM CUSTOM CONTROL DIRECTLY TO T-25A TRANSMITTER USING FRACT MC AND TRANS MC SCS CONNECTIONS ONLY. SEE FIGURE 2-11.

3. WIRES ARE #20 STRANDED COPPER, EXCEPT WHERE OTHERWISE NOTED. SHIELDED WIRES ARE #20 STRANDED COPPER. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE OF SUFFICIENT SIZE (#16 MINIMUM) TO PROVIDE LESS THAN 0.5-VOLT DROP BETWEEN EQUIPMENT AND SOURCE.

4. A 15-AMPERE CIRCUIT BREAKER IS RECOMMENDED FOR CIRCUIT PROTECTION.

5. USED ON ARC TYPE CC-10A CUSTOM CONTROL UNIT ONLY.

6. CONNECTIONS SHOWN ARE USED WHEN RECEIVER DYNAVERTER OR DYNAMOTOR SUPPLIES HIGH VOLTAGE TO T-25A. IF DV-12A DYNAVERTER IS INSTALLED ON T-25A: (1) DO NOT INTERCONNECT J105 OF R-32 AND J111 OF T-25A, (2) CONNECT JUMPER BETWEEN PINS 5 AND 7 OF J111, AND (3) INSTALL WIRED PLUG ARC-11934 (FURNISHED WITH R-32) ON J105.



22793C

Figure 2–14. T-25A Transmitter and Type 15E VHF Navigation Equipment, Interconnection Diagram

NOTES:

1. UNMARKED WIRES ARE #20 STRANDED COPPER, FIBROUS-GLASS INSULATION SHIELDED WIRES ARE #20 COPPER. W MARKED WITH AN ASTERISK (*) ARE O FICIENT SIZE (#16 MINIMUM) TO PROV LESS THAN 0.5-VOLT DROP BETWEEN EQUIPMENT AND SOURCE.

2. A 15-AMPERE CIRCUIT BREAKER (NOT SUPPLIED) IS RECOMMENDED FOR CIR PROTECTION.

3. CONNECTIONS SHOWN ARE USED WHEN RECEIVER DYNAVERTER OR DYNAMOT SUPPLIES HIGH VOLTAGE TO T-25A. I DV-12A DYNAVERTER IS INSTALLED O T-25A: (1) DO NOT INTERCONNECT J3 R-34A AND J111 OF T-25A, (2) CONNEC JUMPER BETWEEN PINS 5 AND 7 OF J1 (3) CONNECT PIN C OF J111 TO NEGAT TERMINAL OF LV SUPPLY, AND (4) INS WIRED PLUG ARC-11934 (FURNISHED W R-34A) ON J3.

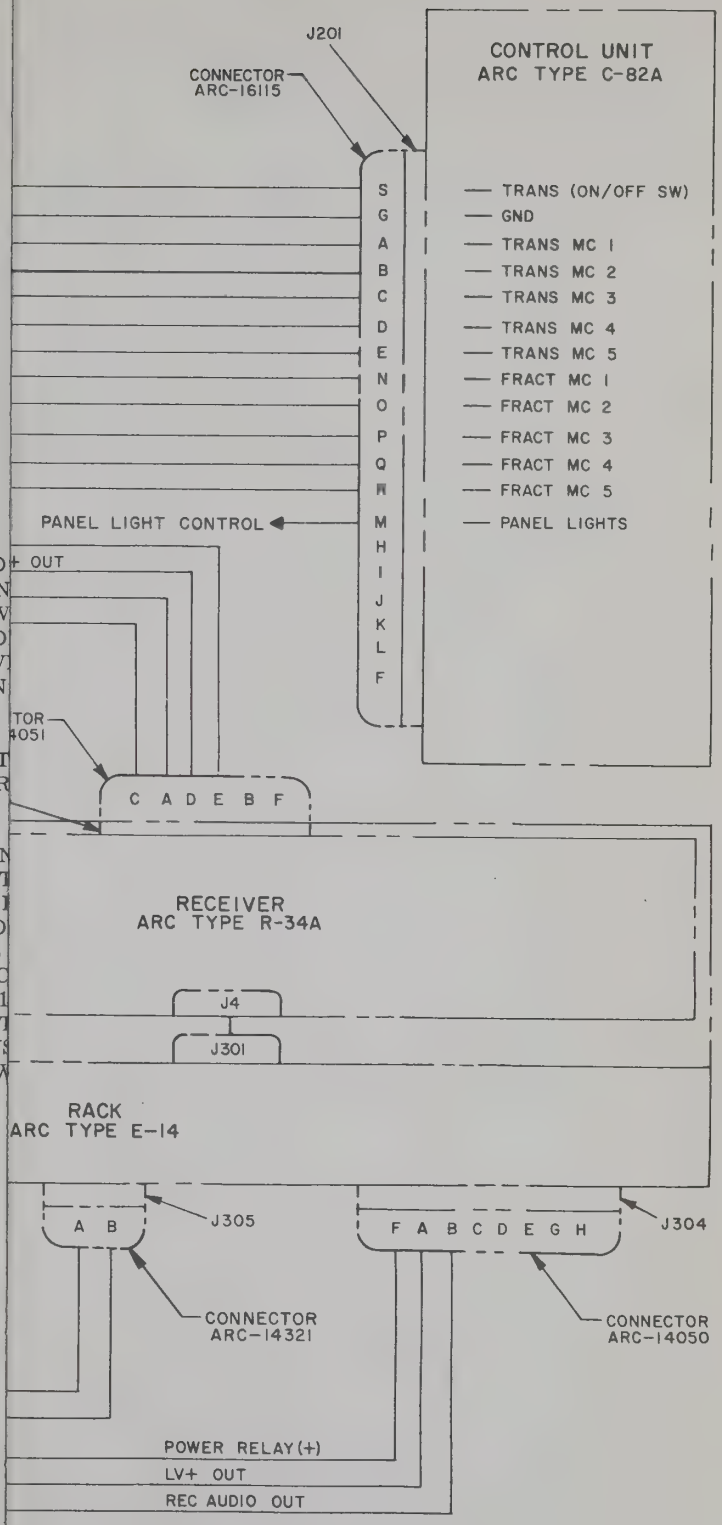


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Figure 2–15. T-25A Transmitter and Type 15F VHF Navigation Equipment, Interconnection Diagram

NOTES:

1. UNMARKED WIRES ARE #20 STRANDED COPPER, FIBROUS-GLASS INSULATION. SHIELDED WIRES ARE #20 COPPER. WIRES MARKED WITH AN ASTERISK (*) ARE OF SUFFICIENT SIZE (#16 MINIMUM) TO PROVIDE LESS THAN 0.5-VOLT DROP BETWEEN EQUIPMENT AND SOURCE.

2. A 15-AMPERE CIRCUIT BREAKER (NOT SUPPLIED) IS RECOMMENDED FOR CIRCUIT PROTECTION.

3. CONNECTIONS SHOWN ARE USED WHEN RECEIVER DYNAVERTER OR DYNAMOTOR SUPPLIES HIGH VOLTAGE TO T-25A. IF DV-12A DYNAVERTER IS INSTALLED ON T-25A: (1) DO NOT INTERCONNECT J3 OF R-34A AND J111 OF T-25A, (2) CONNECT JUMPER BETWEEN PINS 5 AND 7 OF J111, (3) CONNECT PIN C OF J111 TO NEGATIVE TERMINAL OF LV SUPPLY, AND (4) INSTALL WIRED PLUG ARC-11934 (FURNISHED WITH R-34A) ON J3.

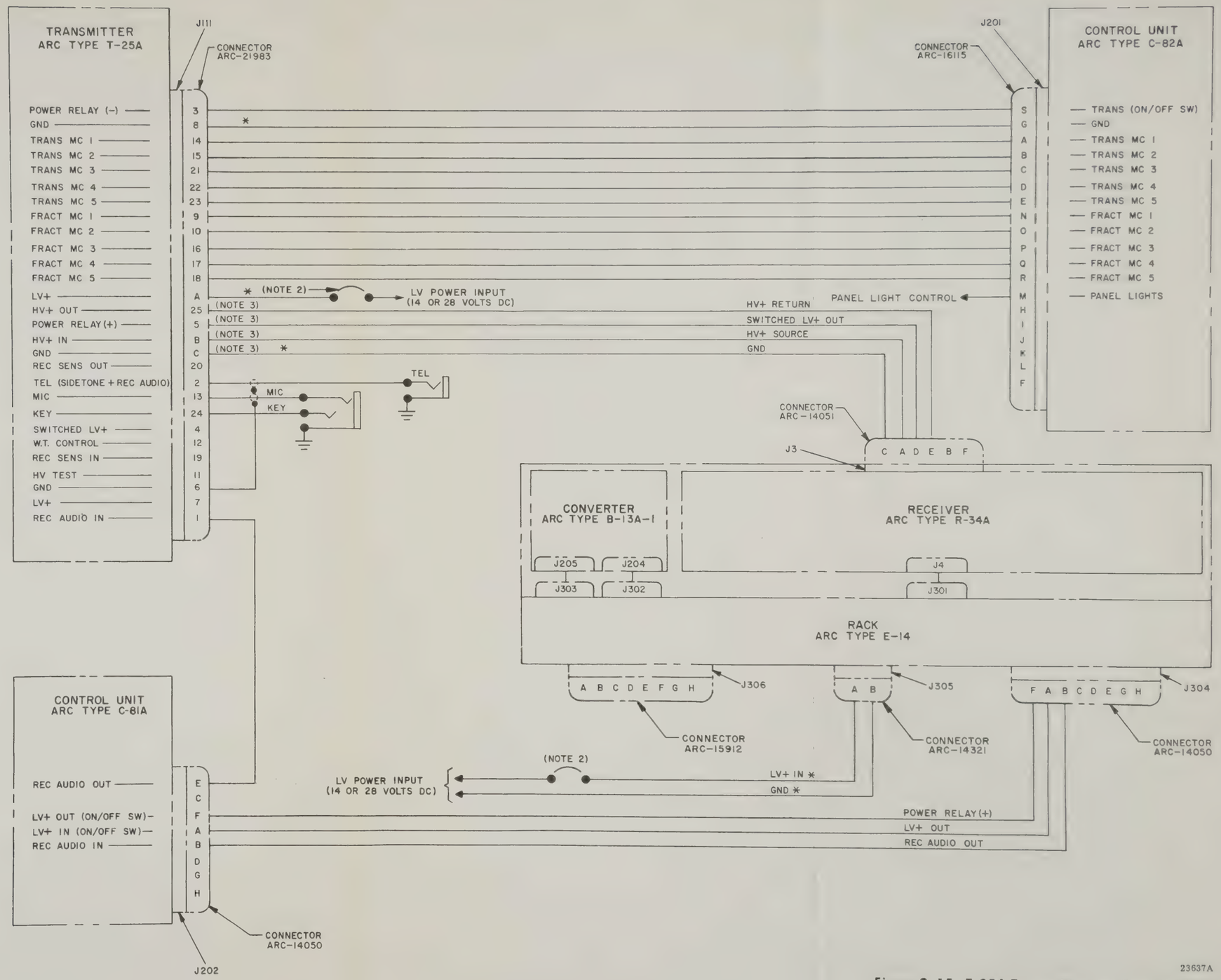

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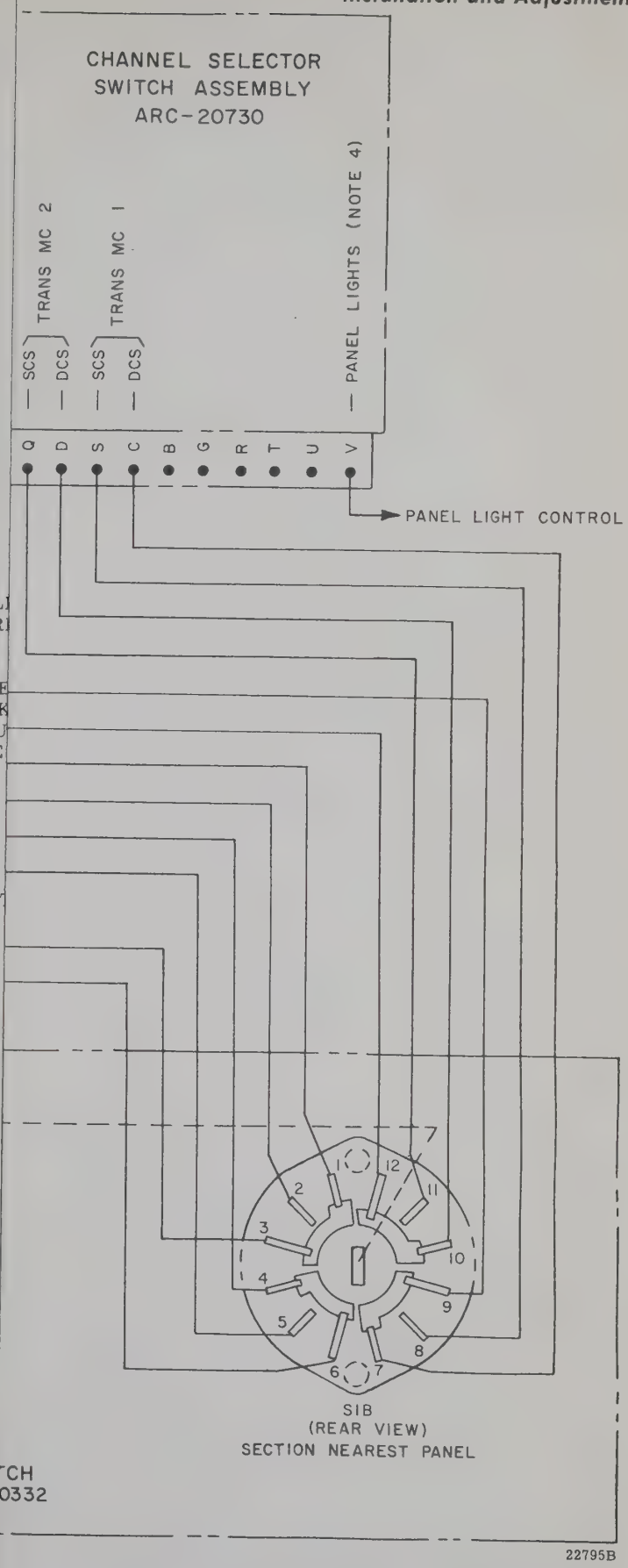
Figure 2–15. T-25A Transmitter and Type 15F VHF Navigation Equipment, Interconnection Diagram



NOTES:

1. IF AUTOMATIC CHANNELING FOR WHISTL
THROUGH ON DCS IS DESIRED, SEE FIGUR
2-13 AND 2-14.

2. WIRES ARE #20 STRANDED COPPER, EXCE
WHERE OTHERWISE NOTED. WIRES MARK
WITH A DOUBLE ASTERISK (**) ARE OF SU
FICIENT SIZE (#16 MINIMUM) TO PROVIDE
LESS THAN 0.5-VOLT DROP BETWEEN
EQUIPMENT AND SOURCE.

3. FOR COMPLETE SYSTEM DIAGRAMS, SEE
FIGURES 2-13, 2-14, and 2-15.

4. USED ON ARC TYPE CC-10A CUSTOM CON
UNIT ONLY.

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ure 2–16. T-25A Transmitter, CC-10A Custom Control Unit, and SCS-DCS Switch, Interconnection Diagram

NOTES:

1. IF AUTOMATIC CHANNELING FOR WHISTLE-THROUGH ON DCS IS DESIRED, SEE FIGURES 2-13 AND 2-14.
2. WIRES ARE #20 STRANDED COPPER, EXCEPT WHERE OTHERWISE NOTED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE OF SUFFICIENT SIZE (#16 MINIMUM) TO PROVIDE LESS THAN 0.5-VOLT DROP BETWEEN EQUIPMENT AND SOURCE.
3. FOR COMPLETE SYSTEM DIAGRAMS, SEE FIGURES 2-13, 2-14, and 2-15.
4. USED ON ARC TYPE CC-10A CUSTOM CONTROL UNIT ONLY.

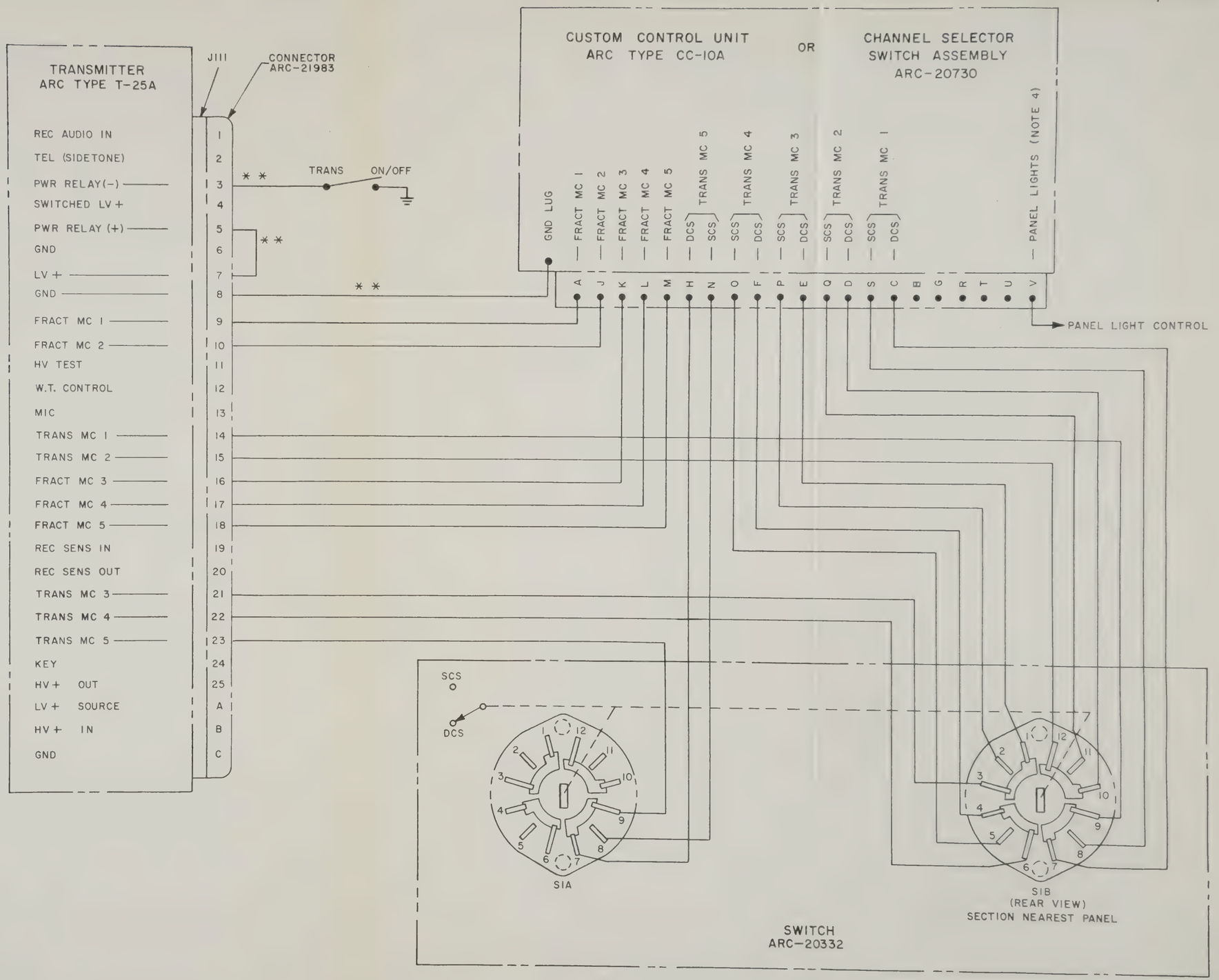

Figure 2–16. T-25A Transmitter, CC-10A Custom Control Unit, and SCS-DCS Switch, Interconnection Diagram

SECTION III
OPERATION

3–1. OPERATING LIMITATIONS AND PRECAUTIONS.

The ARC Type T-25A VHF Transmitter operates over a frequency range of 118.00–135.95 mc in 50-kc steps, providing a total of 360 channels. The power output is 6 to 10 watts (8 watts nominal), and the transmitter meets FAA TSO C-37, Category A (altitude to 60,000 feet). The unit will operate satisfactorily over a temperature range of −55° to 71° C.

3–2. OPERATING CONTROLS.

The T-25A Transmitter does not include any operating controls. Operating controls are located externally and may be part of a special control unit, such as the ARC Type C-82A Control Unit, or a custom control installation using either a Channel Selector Switch ARC-20730 or an ARC Type CC-10A Custom Control Unit. In general, the following controls may be available: a power on-off switch, a channel selector switch assembly, a receiver volume control, and a whistle-through tuning control. If the optional feature of SCS-DCS operation is desired, a switch designated SCS-DCS must be added to the control panel installation (refer to paragraph 2–5).

The C-82A Control Unit, shown in Figure 3–1, is an edge-lighted, plastic-panel control assembly designed for use in aircraft equipped with console mounting facilities. It contains a primary power on-off switch, a megacycle channel selector switch, and a fractional megacycle channel selector switch. (Channel Selector Switch ARC-20730 or the ARC Type CC-10A Custom Control Unit, provided for custom control installations, is similar to the channel selector switch assembly used in the C-82A). The functions of these controls are described in Table 3–1.

3–3. OPERATION.

The following procedure refers to the C-82A controls shown in Figure 3–1. If a custom panel installation is used in place of the C-82A, similarly designated controls will be used.

Step 1. Apply primary power to the T-25A by setting the power switch to ON. Allow approximately 30 seconds for the T-25A to warm up. If a DV-12A is not installed on the T-25A, check that primary power is also applied to the receiver which supplies high-voltage to the T-25A.

Step 2. Select the channel frequency by rotating the megacycle channel selector switch to the desired megacycle setting; then rotate the fractional megacycle channel selector switch to the desired fractional megacycle setting.

Step 3. Tune the associated receiver to the desired receiving frequency. If a whistle-through control and a manually tuned receiver are installed, the receiver may be precisely tuned to receive on any one of the transmitting channel frequencies as follows:

a. Set the megacycle and fractional megacycle channel selector switches to the desired receiving frequency.
b. Press the receiver tuning crank while tuning for maximum whistle.
c. If the receiving frequency differs from the transmitting frequency, reset the channel selector switches to the transmitting frequency.

Step 4. To transmit, close the microphone switch, and speak directly into the microphone. The transmission will be monitored in the sidetone circuit.

Step 5. To receive, open the microphone switch.

TABLE 3–1. OPERATING CONTROLS

Control	*Function*
Power Switch (ON-OFF)	Applies primary power to the T-25A.
Megacycle Channel Selector Switch (118–135 MC)	Selects the megacycle channel frequency, as indicated on the megacycle portion of the channel frequency dial (MC). Clockwise rotation of the selector knob increases frequency in 1.0-mc steps from 118–135 mc. Beyond 135 mc, the selector knob returns to 118 mc. The selector knob may be rotated in either direction to reach the desired megacycle frequency.
Fractional Megacycle Channel Selector Switch (.00–.95 MC)	Selects the fractional megacycle channel frequency as indicated on the fractional megacycle portion of the channel frequency dial (MC). Clockwise rotation of the selector knob increases frequency in 0.05-mc steps from 0.00–0.95 mc. Beyond 0.95 mc, the selector returns to 0.00 mc. The selector knob may be rotated in either direction to reach the desired fractional megacycle frequency.

3–4. NORMAL PERFORMANCE INDICATIONS.

To enable the operator to check T-25A performance prior to take-off or during flight, two checks, which are independent of two-way communication tests, can be made.

1. Modulator Test. Select any channel frequency and close the microphone switch. Speak directly into the microphone and listen for sidetone output in the headphones. The presence of sidetone output indicates that the modulator is functioning normally.

2. Transmitter Test. Select any channel frequency. If a whistle-through control is available, press the receiver tuning crank and tune for maximum whistle. The presence of a whistle-through signal is a good indication that the transmitter circuits are operating normally.

Note

This test does not check operation of the transmitter output tube, V106, since it is not keyed during whistle-through operation.

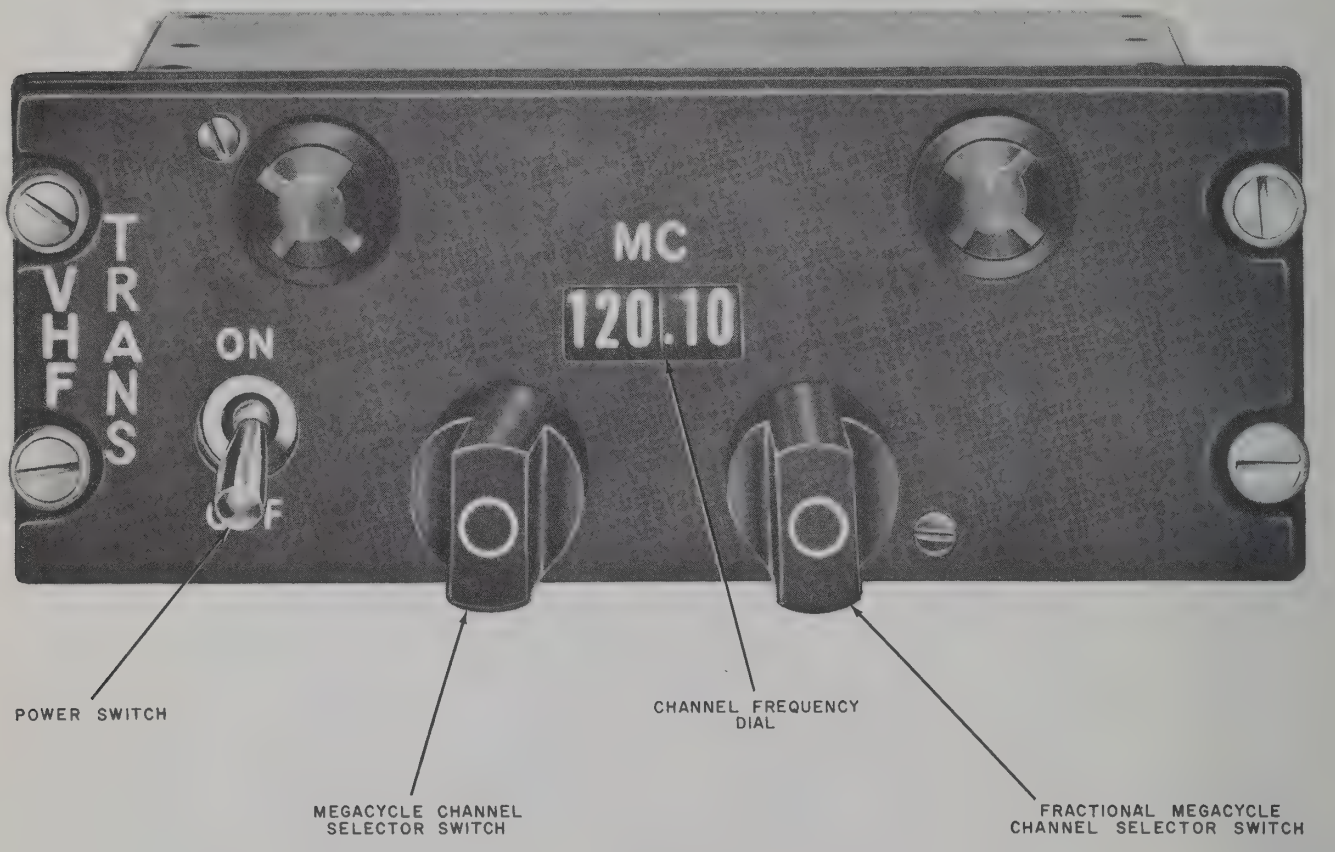

Figure 3–1. C-82A Control Unit, Operating Controls

SECTION IV
PRINCIPLES OF OPERATION

4–1. INTRODUCTION.

This section contains information covering the principles of operation of the T-25A Transmitter, DV-12A Dynaverter, and C-82A Control Unit. The crystal-saving circuit, the channel selection circuit, and the channel tuning mechanism, which are unusual features of the T-25A, are discussed first, followed by an over-all functional description, and then a detailed description of the transmitter and modulator circuits. A discussion of the DV-12A and C-82A operating principles follows the T-25A explanation.

4–2. CRYSTAL-SAVING CIRCUIT.

The crystal-saving circuit used in the T-25A employs 38 subminiature crystals for the 360 channels available. These crystals are divided into two groups installed in two servo-controlled crystal drums. One crystal drum, designated the fractional megacycle crystal drum, contains 20 crystals and operates with a crystal oscillator which generates the fractional megacycle portion of the transmitting frequency. The other crystal drum, designated the megacycle crystal drum, contains 18 crystals and operates with a crystal oscillator which generates the whole megacycle portion of the transmitting frequency. The fractional megacycle crystals cover the frequency range of 10.00–10.95 mc in 0.05-mc steps. The megacycle crystals cover the frequency range of 54.00–62.50 mc in 0.5-mc steps.

For an example of the combination of crystal oscillator outputs (frequency synthesis) to produce a desired T-25A frequency, assume that an operating frequency of 120.10 mc has been selected at the C-82A Control Unit. To transmit on 120.10 mc, the output frequency is produced as follows (see Figure 4–1): the fractional megacycle oscillator derives its frequency (in this case 10.10 mc) from a crystal on the fractional megacycle crystal drum corresponding to the fractional megacycle frequency (0.10 mc) selected at the control unit. The megacycle oscillator derives its frequency (in this case 55.00 mc) from a crystal on the megacycle crystal drum corresponding to the whole megacycle frequency (120 mc) selected at the control unit. The crystal frequency is doubled to 110 mc and then mixed with the fractional megacycle oscillator frequency (in this case 10.10 mc) to produce the desired transmitting frequency of 120.10 mc.

4–3. CHANNEL SELECTION.

Selection of any one of the 360 channels in the T-25A Transmitter is made at the C-82A Control Unit by means of ten interconnecting wires divided into two 5-wire, open-seeking, binary re-entrant switching circuits. There are two channel selector switches in the C-82A: the megacycle channel selector switch and the fractional megacycle channel selector switch. The megacycle channel selector switch controls the positioning of the megacycle crystal drum in the T-25A, and the fractional megacycle channel selector switch controls the positioning of the fractional megacycle crystal drum.

A functional diagram of the T-25A channel-selecting mechanism is shown in Figure 4–2. A small motor is used to drive the two crystal drums and their associated linkages. The crystal drums are pawl-and-ratchet rotated by cams driven by the motor through reduction gears. Under static conditions, the pawls are locked in their home positions by unenergized latching relays. When a new channel is selected, the latching relays on the crystal drums affected are energized. The relay contacts energize the motor circuit, rotating the drive cam against the drive-pawl lever and releasing the spring-loaded latching lever. The released drive-pawl levers rest against the motor-driven cam, driving the crystal drums through the pawls until the desired crystal frequency on each drum is reached, then the relay circuit is opened and the drive-pawl levers are locked in the home position. In the locked position, a round indexing pin on the index lock arm assembly slides into a notch on the index plate, accurately locking the drum in the selected position. The motor continues to run until both drive-pawl levers are latched.

Due to the space allotted for the crystal drums and the mechanical requirements of the selector switch in the C-82A, both crystal drums are identical in size. The fractional megacycle crystal drum requires space for 20 crystals; therefore, a 20-position drum is also used for the megacycle crystal drum, although space for only 18 crystals is required for this drum. The two vacant positions on the megacycle crystal drum provide space for the return angle of the tuning plate cam follower. Since all 20 crystal positions are used in the fractional megacycle crystal drum, a heart-shaped tuning cam is used

for fractional megacycle tuning. To provide correct alignment for this cam, the 0.10-mc crystals are arranged in order of ascending frequency for drum positions 1 through 10, and the 0.05-mc crystals are arranged in descending order for positions 10 through 20.

The switching functions for the two master selector switches in the C-82A Control Unit are as follows: The 20-position fractional megacycle channel selector switch selects the alternately placed crystals on the fractional megacycle crystal drum in the correct frequency sequence. The 18-position megacycle channel selector switch selects one of 18 crystals on the megacycle crystal drum without stopping on either of the two blank spaces on the drum. The binary code employed to meet these switching requirements uses five control wires per drum. Figure 4–3 is a simplified schematic diagram of the binary code switching sequence used for the 20-position crystal drums, the 20-position fractional megacycle selector switch, and the 18-position megacycle selector switch. The code can be described as two re-entrant, ten-digit codes which are also re-entrant with each other to form a twenty-digit code, with the further characteristic that two digits can be removed and re-entrance maintained.

4–4. CHANNEL TUNING.

The main, or megacycle, tuning of the transmitter assembly is accomplished by variable, air-dielectric, butterfly-type capacitors. Fractional megacycle tuning is accomplished by inductance trimming. The r-f sections of the transmitter assembly are divided into compartments, each compartment having one variable capacitor. A functional diagram of the megacycle tuning mechanism is shown in Figure 4–4. A tuning arm assembly is mounted on the rotor shaft of each variable capacitor. Mounted at the end of each tuning arm assembly is a miniature ball bearing whose axis of rotation is parallel to the rotor shaft. Each ball bearing is spring-loaded against a straight surface of a tuning plate. The straight surface is perpendicular to the direction of travel of the tuning plate, which is positioned by a cam mounted directly on the shaft of the transmitter megacycle crystal drum. The length of each tuning arm assembly is adjustable so that, for a fixed displacement of the tuning plate, the angle of rotation of each capacitor shaft is independently adjustable. Minimum capacitance is adjusted by rotating the capacitor shaft with respect to its tuning arm assembly.

The two adjustments of angular rotation and minimum capacitance are completely independent and permit accurate tracking of the tuned circuits. Only one adjustment is required at each end of the frequency band. With the tuning plate in its highest frequency position (135.00 mc), minimum capacitance for each tuning capacitor is adjusted by loosening the setscrew which fastens the tuning arm to the capacitor rotor shaft, rotating the shaft to the desired minimum value, and then tightening the setscrew. In this position, the line of angular rotation adjustment is perpendicular to the line of motion of the tuning plate; therefore, the length of the tuning arm has no effect on the minimum-capacitance adjustment. With the tuning plate in its lowest frequency position (118.00 mc), the required angular rotation for each tuning capacitor is adjusted by the tuning arm screw, which varies the effective length of the tuning arm assembly.

Fractional megacycle tuning of the transmitter is accomplished by slug-tuning the plate circuit of fractional megacycle oscillator-balanced mixer V102 and the grid circuit of push-pull power amplifier V106. A cam mounted on the shaft of the fractional megacycle crystal drum is used to control axial movement of eddy current slugs into the respective tank circuits.

4–5. T-25A TRANSMITTER.

Transmitter Assembly. As shown in Figure 4–1, the transmitter assembly consists of a megacycle crystal oscillator-doubler, a fractional megacycle oscillator-balanced mixer, an r-f amplifier, an r-f driver amplifier, and a push-pull power amplifier. A tone oscillator is included in the transmitter assembly to provide the audio signal for whistle-through tuning. During transmission, antenna relay K103 is energized, transferring the vhf antenna from the receiver input to the transmitter output. One of the 360 channels available in the 118.00–135.95 mc band is selected by switch action in the C-82A or other control unit. The r-f output signal is obtained by combining a whole megacycle signal with a fractional megacycle signal. The whole megacycle r-f signal (108–125 mc) is generated by a crystal oscillator-doubler, V101, whose fundamental frequency is determined by connecting one of 18 drum-mounted subminiature crystals (54.0–62.5 mc in 0.5-mc steps) to the crystal oscillator input. The fractional megacycle r-f signal is generated by a crystal oscillator, part of V102, whose frequency is determined by connecting one of 20 drum-mounted subminiature crystals (10.00–10.95 mc in 0.05-mc steps) to the crystal oscillator input. The whole megacycle and fractional megacycle signals are combined in the balanced mixer, part of V102, to generate a low-voltage r-f signal at the desired frequency (118.00–135.95 mc). The r-f voltage is amplified by two stages of r-f amplification, V103 and V105, and then coupled to the output stage, V106. This stage is a balanced, push-pull, r-f amplifier that is plate- and screen-modulated by voice frequencies from the push-pull modulator transistors, Q305 and Q306. The r-f output voltage (118.00–135.95 mc) is fed to the antenna through the normally open contacts of antenna relay K103. The individual circuits in the transmitter assembly are described in the following paragraphs.

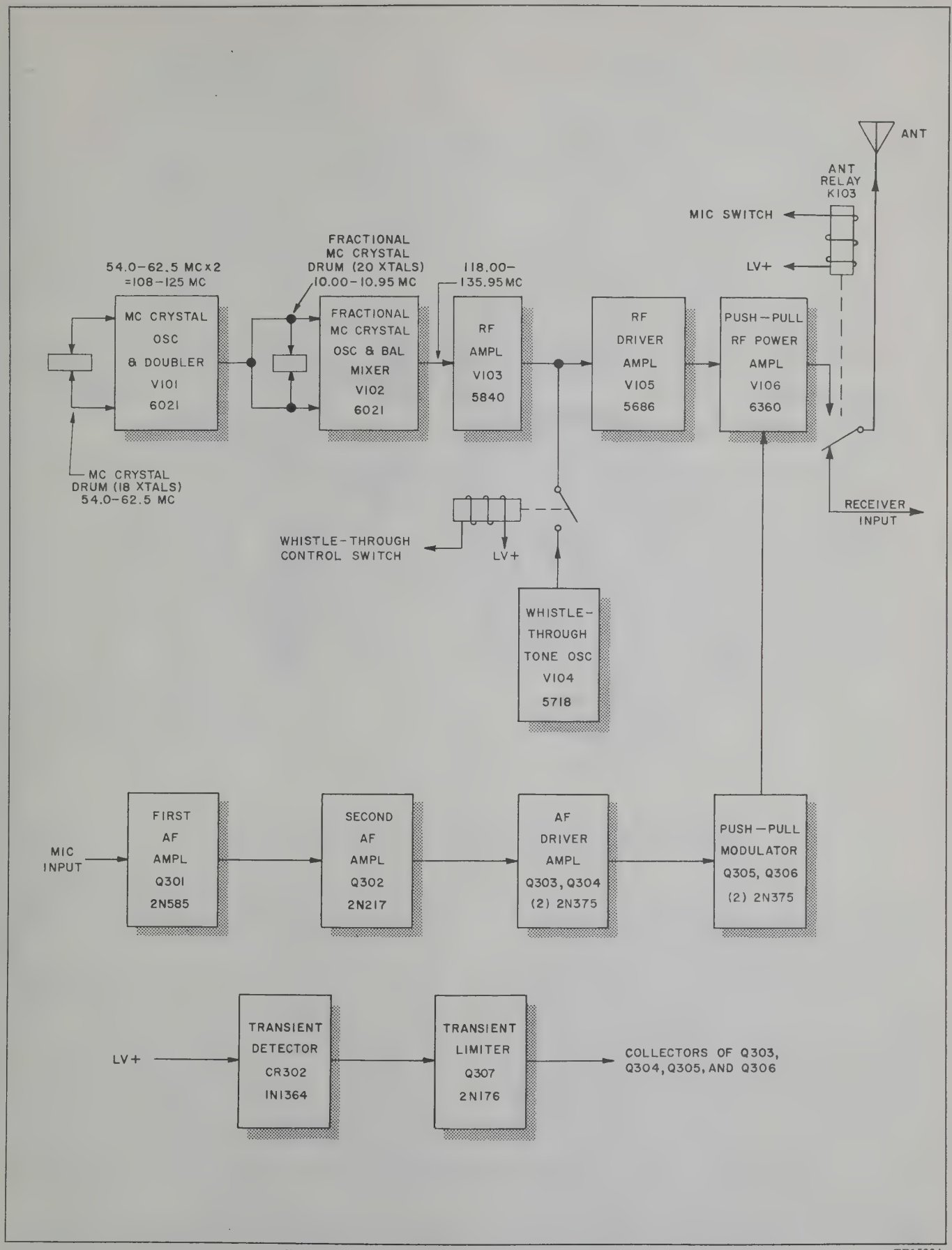
ANT
ANT RELAY K103
MIC SWITCH
LV+
54.0–62.5 MC x2 =108–125 MC
FRACTIONAL MC CRYSTAL DRUM (20 XTALS) 10.00–10.95 MC
118.00–135.95 MC
MC CRYSTAL OSC & DOUBLER V101 6021
FRACTIONAL MC CRYSTAL OSC & BAL MIXER V102 6021
RF AMPL V103 5840
RF DRIVER AMPL V105 5686
PUSH–PULL RF POWER AMPL V106 6360
MC CRYSTAL DRUM (18 XTALS) 54.0–62.5 MC
RECEIVER INPUT
WHISTLE–THROUGH CONTROL SWITCH
LV+
WHISTLE–THROUGH TONE OSC V104 5718
MIC INPUT
FIRST AF AMPL Q301 2N585
SECOND AF AMPL Q302 2N217
AF DRIVER AMPL Q303, Q304 (2) 2N375
PUSH–PULL MODULATOR Q305, Q306 (2) 2N375
LV+
TRANSIENT DETECTOR CR302 IN1364
TRANSIENT LIMITER Q307 2N176
COLLECTORS OF Q303, Q304, Q305, AND Q306

Figure 4–1. T-25A Transmitter, Block Diagram

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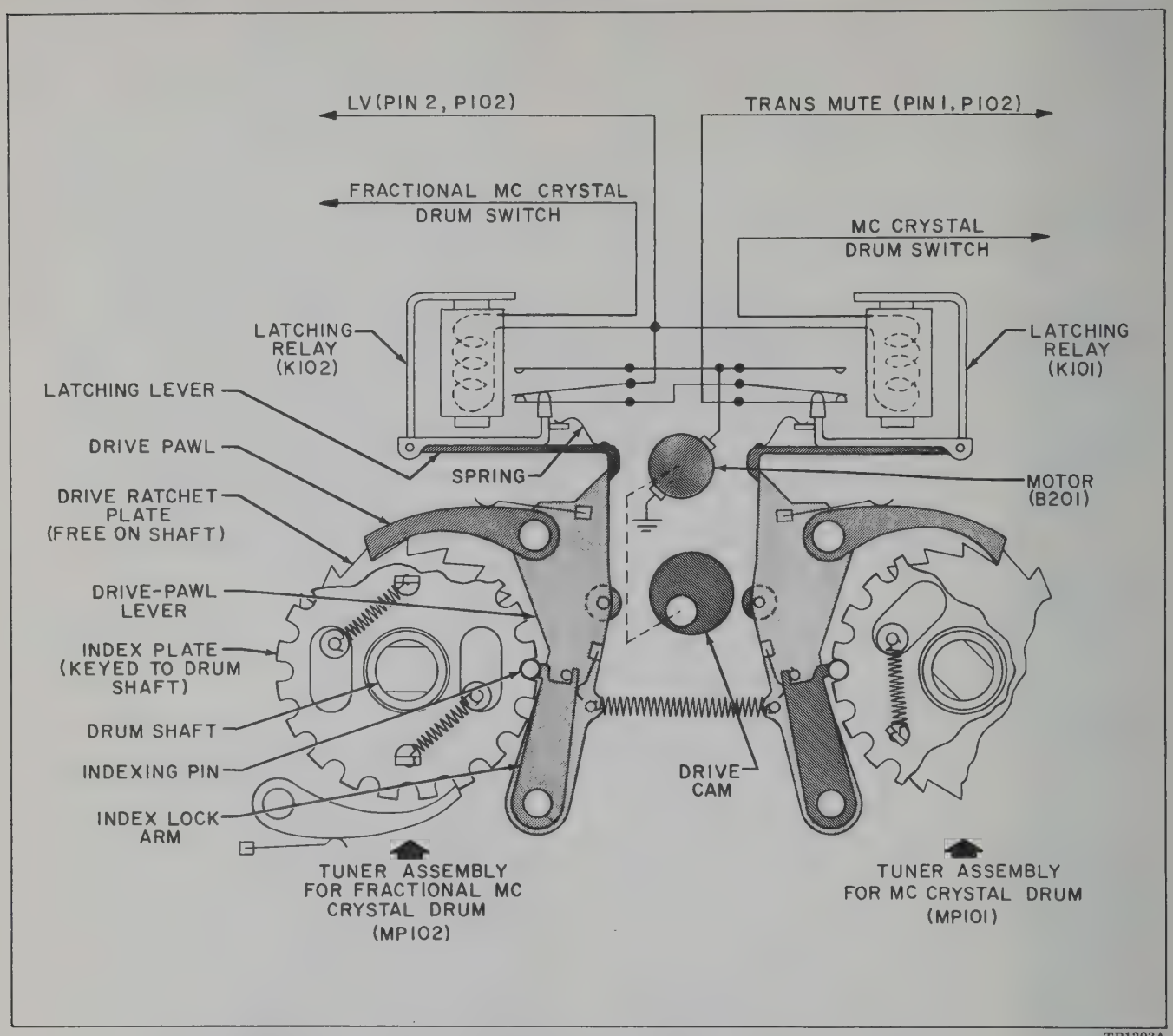

Figure 4–2. T-25A Transmitter, Tuner Assembly, Functional Diagram

MEGACYCLE CRYSTAL OSCILLATOR-DOUBLER. The megacycle crystal oscillator-doubler uses a 6021 twin triode, V101, in a Butler, cathode-coupled, series-mode, crystal oscillator-doubler circuit (see Figure 6–1). The function of this stage is to generate the megacycle portion of the transmitter r-f signal, which is combined with the fractional megacycle r-f signal in the balanced mixer section of V102. Depending upon the setting of megacycle channel selector switch S201A in the C-82A Control Unit, one of the crystals mounted on the megacycle crystal drum (refer to paragraph 4–2) is connected between the cathodes of V101.

The Butler oscillator operates as follows: L103, tuning capacitor C107B, and trimmer capacitor C106 form a tank circuit, which is coupled to the plate of the first triode section of V101 by C104. The tank circuit is tuned to the resonant frequency of the crystal (54.0–62.5 mc). Oscillations appearing at the plate of the first triode are coupled to the grid of the second triode by C102. Since the second triode is connected as a cathode follower, its output cathode voltage is in phase with the output of the first triode. The oscillator crystal, Y101–Y118, oscillating in the series-resonant mode, acts as a low-value pure resistance at its resonant frequency and transmits the voltage appearing at the cathode of the second triode to the cathode of the first triode. In turn, the first triode, connected as a grounded-grid amplifier, reinforces the oscillations at its plate. Thus the positive feedback necessary to sustain oscillation is obtained, but only at the frequency at which the crystal is resonant.

Frequency doubling is accomplished by tuning the plate circuit of the second triode to the second harmonic

C-82A CONTROL UNIT
SWITCHING SEQUENCE
FOR
SELECTOR SWITCHES

SELECTOR SWITCH POSITION		CONTROL WIRE NO. (NOTE 3)				
MC	FRACT	1	2	3	4	5
135	.45	—	⏚	—	⏚	⏚
134	.35	⏚	—	⏚	⏚	⏚
133	.25	—	⏚	⏚	⏚	⏚
132	.15	⏚	⏚	⏚	⏚	—
131	.05	⏚	⏚	⏚	—	—
130	.00	⏚	⏚	—	—	—
129	.10	⏚	—	—	—	⏚
128	.20	—	—	—	⏚	—
127	.30	—	—	⏚	—	—
126	.40	—	⏚	—	—	—
125	.50	⏚	—	—	—	—
124	.60	—	—	—	—	⏚
123	.70	—	—	—	⏚	⏚
122	.80	—	—	⏚	⏚	—
121	.90	—	⏚	⏚	—	—
120	.95	⏚	⏚	—	—	⏚
119	.85	⏚	—	—	⏚	—
118	.75	—	—	⏚	—	⏚
	.65	—	⏚	—	⏚	—
	.55	⏚	—	⏚	—	⏚

T-25A VHF TRANSMITTER
SWITCHING SEQUENCE
FOR
CRYSTAL DRUMS

CRYSTAL DRUM POSITION		CONTROL WIRE NO. (NOTE 3)				
MC	FRACT	1	2	3	4	5
135	.45	—	⏚	—	⏚	⏚
134	.35	⏚	—	⏚	⏚	⏚
133	.25	—	⏚	⏚	⏚	⏚
132	.15	⏚	⏚	⏚	⏚	—
131	.05	⏚	⏚	⏚	—	—
130	.00	⏚	⏚	—	—	—
129	.10	⏚	—	—	—	⏚
128	.20	—	—	—	⏚	—
127	.30	—	—	⏚	—	—
126	.40	—	⏚	—	—	—
125	.50	⏚	—	—	—	—
124	.60	—	—	—	—	⏚
123	.70	—	—	—	⏚	⏚
122	.80	—	—	⏚	⏚	—
121	.90	—	⏚	⏚	—	—
120	.95	⏚	⏚	—	—	⏚
119	.85	⏚	—	—	⏚	—
118	.75	—	—	⏚	—	⏚
X	.65	—	⏚	—	⏚	—
X	.55	⏚	—	⏚	—	⏚

NOTES: 1. ⏚ INDICATES GROUND.

2. — INDICATES WIRES NOT GROUNDED BUT CONNECTED.

3. WIRE NUMBERS REFER TO MEGACYCLE OR FRACTIONAL MEGACYCLE CONTROL WIRE GROUP FOR RELATED SWITCH POSITION (SEE FIGURE 6-1 OR 6-14).

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Figure 4–3. Binary Code Switching Sequence, Simplified Schematic Diagram

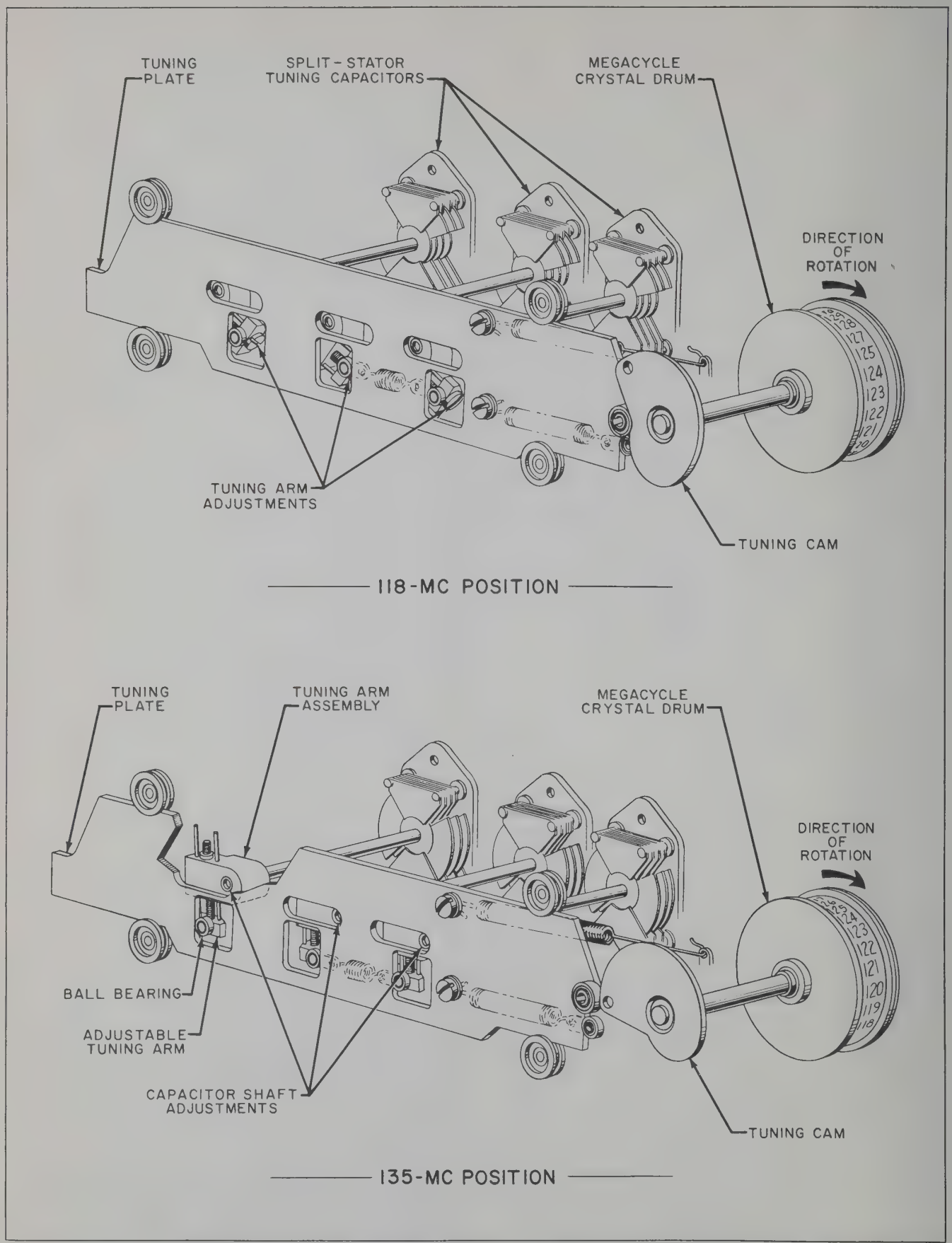


Figure 4–4. Megacycle Tuning Mechanism, 118- and 135-Megacycle Positions, Functional Diagram TP1297A

(108–125 mc) of the crystal oscillator. L102 and C107A comprise the doubler tank circuit, which is connected to the plate of the second triode by C103. C108 is a trimmer capacitor. The output of the doubler is coupled to the grids of V102 by C109 and C110.

R101 and R102 are the cathode load resistors for the first and second triode sections, respectively. A series network consisting of L101 and C101 is connected in parallel with the crystal (Y101–Y118). L101 resonates with the crystal shunt capacitance to insure that the crystal acts as a pure resistance at its resonant frequency. C101 is used as a d-c blocking capacitor. R103 is used to suppress parasitic oscillations. R106 and R105 are the plate load resistors for the first and second triode sections, respectively. C105 is used as an r-f bypass capacitor for the plate supply voltage. R127 is used to drop the +250-volt dc supply voltage to the +150 volts required for the plate circuits of V101.

FRACTIONAL MEGACYCLE CRYSTAL OSCILLATOR-BALANCED MIXER. A 6021 twin triode, V102, is used as a push-pull Pierce crystal oscillator and balanced mixer. This stage generates the fractional megacycle portion of the transmitter r-f signal and combines it with the megacycle portion of the r-f signal generated by V101. Depending upon the setting of fractional megacycle channel selector switch S201B in the C-82A Control Unit, one of the crystals (10.00–10.95 mc) mounted on the fractional megacycle crystal drum (refer to paragraph 4–2) is connected between the grids of V102. The grids are also fed with 108–125 mc signals from V101. The plates of V102 are bypassed for the 10.00–10.95 mc crystal oscillator signals, but the plate tank circuit is tuned to resonate to the sum frequency of both signals (118.00–135.95 mc) to accomplish the mixing.

The 108–125 mc signal input from V101 is parallel-fed to the grids of V102 through C109 and C110. R107 and R108 provide the d-c return to ground for the balanced grid circuit. C111 and C113 form a 1:10 r-f voltage divider for the grid-to-ground circuit of the first triode section of V102. The r-f voltage developed across C111 is the oscillator feedback voltage for the first triode. Similarly, C112 and C114 form an r-f voltage divider for the grid-to-ground circuit of the second triode, with the r-f voltage developed across C112 representing the feedback voltage for the second triode. L104 and L105, connected in the feedback paths of the first and second triodes, respectively, are r-f chokes which pass the 10.00–10.95 mc voltages of the crystal oscillator, but present a high impedance to the 108–125 mc input signals.

R109 and R110 are the cathode resistors for the balanced triode circuit. L106 is connected between the cathodes to provide greater oscillator stability and output. R111 is used as a voltage-dropping resistor for the plate supply to V102. The plates of V102 are returned to r-f ground through L107, L108, R111, and C120. L107 and L108 are r-f chokes which bypass the 10-mc crystal oscillator voltage to ground, but which act as a high impedance to the mixer output signals (118.00–135.95 mc).

The balanced mixer output is coupled to the tank circuit through C115 and C116. The tank circuit is both inductance-tuned and capacitance-tuned to resonate at the sum frequency of the two input signals. Slug-tuned coil L109 is resonated to the fractional portion of the sum frequency by connecting the slugs to a cam on the fractional megacycle tuner drive shaft. C117 is a split-stator capacitor connected to the cam-driven main (or megacycle) tuning plate. C119 is a fixed trimmer capacitor. One side of the mixer tank circuit is connected to the grid of V103; the other side is connected to ground through R112, the grid resistor for V103. C118 is a trimmer capacitor used to balance the grid circuit-to-ground capacitance of V103.

R-F AMPLIFIER. R-f amplifier V103 is a 5840 pentode. The 118.00–135.95 mc output of V102 is connected directly to the grid of V103. The input voltage is amplified by V103, and the output appearing at the plate tank circuit is coupled to the grid of V105 through C126. The plate tank circuit, consisting of L111 and C127, is coupled to the plate through C125. L110 is an r-f choke, and R127 is a voltage-dropping resistor for the plate and screen supply to V103.

R-F DRIVER-AMPLIFIER. A 5686 pentode is used for r-f driver amplifier V105. The 118.00–135.95 mc output of V103 is connected to the grid of V105. The signal is amplified further by V105, and the balanced output of the plate tank circuit is coupled to the grid circuit of push-pull power amplifier V106.

R118 provides operating bias for V105. A test point, TP1, for checking grid bias, is provided at the junction of R118 and L113. L113 is an r-f choke used to prevent rf from appearing at TP1. L115 and C137 comprise the balanced plate tank circuit, which is decoupled from the d-c plate supply by L114 and C133. L115 is tuned to the fractional portion of the r-f signal frequency by connecting the slugs to a cam on the fractional megacycle tuner drive, while C137 is connected to the main (or megacycle) tuning plate. C130 is used as a neutralizing capacitor for V105. C136 and C138 couple the balanced output of the tank circuit to the grids of V106.

PUSH-PULL POWER AMPLIFIER. Push-pull power amplifier V106 is a 6360 twin tetrode. The 118.00–135.95 mc r-f output of V105 is coupled to the grids of V106. The r-f signal is amplified by V106, and the output voltage appearing in the plate tank circuit is inductively coupled to the antenna by low-impedance pickup loop

L120. The r-f carrier output is both plate- and screen-modulated by the output of push-pull modulator transistors Q305 and Q306.

The balanced d-c return path for one grid consists of L116 and R121; for the other grid, it consists of L117 and R122. Two test points, TP2 and TP3, are provided at the junction of L116 and R121 and the junction of L117 and R122, respectively, for checking the grid bias of the power amplifier. L116 and L117 are r-f chokes used to prevent r-f from appearing at TP2 and TP3. The balanced plate tank circuit consists of L118 and C140. The center tap of L118 is connected to the secondary of modulation transformer T102 through a decoupling network consisting of L119 and C141. The screen grids are connected to a voltage divider consisting of R124 and R125 which, in turn, is connected across the secondary of T102. Low-impedance pickup loop L120 couples the r-f output of V106 to ANT jack J105 through filter assembly Z101 and the normally open contacts of antenna relay K103. Filter assembly Z101 is a low-pass filter designed to pass the fundamental transmitting frequencies (118.00–135.95 mc) and to reject harmonic frequencies.

The unmodulated carrier output of the T-25A is 6–10 watts throughout its tuning range. High-level modulation of the carrier is employed, with high-percentage modulation (above 85%) maintained by a limiting circuit in the modulator.

WHISTLE-THROUGH CIRCUIT. The whistle-through circuit includes tone oscillator V104, relays K106 and K107, and WHISTLE LEVEL control R133. When the tuning crank of the control unit is depressed, it closes a switch, energizing K106 and K107. The energized relays perform the following functions:

1. K106 connects the high-voltage supply to V104, thus actuating the whistle-through tone oscillator, and transfers the receiver r-f sensitivity control line from the sensitivity control in the receiver control unit to WHISTLE LEVEL control R133. The function of R133 is to reduce the sensitivity of the receiver being tuned during the whistle-through condition.

2. K101 connects the high-voltage supply to V101, V102, V103, and V105 and disconnects the switched high-voltage supply from power amplifier V106.

The output of the tone oscillator is applied to the grid of driver amplifier V105 to provide approximately 100% grid modulation for tuning purposes. For whistle-through operation, the driver amplifier is used as the output stage, with its output loosely coupled to REC antenna jack J106 through C144. When the receiver is tuned to produce maximum whistle in the headset, it is tuned to the frequency of the transmitter.

A 5718 triode, V104, is used for the whistle-through tone oscillator. A series-fed, tuned-plate audio oscillator circuit is employed, with a small 1:3 audio transformer, T101, used to feed back a portion of the plate circuit oscillations to the grid circuit. The tone frequency of approximately 1000 cps is determined by the inductance of the T101 secondary and C128. R117 is used as a voltage-dropping resistor, and C124 is an a-f bypass capacitor. The oscillator output is coupled to the grid of V105 through d-c blocking capacitor C129 and r-f choke L112.

SIDETONE CIRCUIT. Sidetone voltage is obtained from the tertiary winding (terminals 6 and 7) of modulation transformer T102, and is connected to the TEL (SIDETONE) line through R131, R132, and the normally open contacts of sidetone relay K105. Potentiometer R131, the SIDETONE control, is connected across the tertiary winding of T102 and is used to adjust the level of sidetone voltage appearing at the TEL (SIDETONE) line. R132, connected in series with the sidetone voltage lead, prevents the relatively low-impedance sidetone circuit from loading the TEL (SIDETONE) line.

RELAY CIRCUITS. For normal T-25A operation, relays K103 and K105 perform all switching functions. When the transmitter is keyed, K103 transfers the vhf antenna from the associated receiver input to the T-25A output and transfers the high voltage from the associated receiver to the transmitter circuit. K105 connects the low-voltage supply to the modulator circuit and also transfers the TEL line from the receiver audio output to the modulator sidetone output. Muting of the transmitter during the tuning cycle is accomplished by connecting the low-voltage supply to the solenoids of K103 and K105 through the normally closed contacts of tuner assembly relays K101 and K102. During the tuning cycle, either K101 or K102, or both, are energized, disconnecting the low-voltage supply from the solenoids of K103 and K105, and effectively muting the transmitter.

K104, the power relay controlled by the ON-OFF switch in the C-82A Control Unit, is used to apply low voltage to all circuits in the T-25A. Crystal diode CR102 [1] is connected in parallel with the solenoids of K103 and K105 to limit the inductive surge of the relays when they are deenergized. C153 and C154 are r-f bypass capacitors for the high- and low-voltage supplies, respectively.

VOLTAGE TEST CIRCUIT. A voltage test circuit consisting of CR101, R128, C151, and TEST jack J104 is provided to check for the presence of r-f output using an external d-c voltmeter. When the transmitter is keyed, the circuit is connected across low-impedance pickup loop L120. Crystal diode CR101 rectifies the r-f output for use with a d-c voltmeter connected between the TEST

[1] In some units, thyrite resistor TY101 was used in place of CR102.

jack and chassis ground. R128 prevents any loss of transmitter output due to the shunting impedance of CR101. C151 bypasses the TEST jack for r-f voltages.

HEATER CIRCUITS. The T-25A is available in both 14-volt and 28-volt dc models. Referring to the 28-volt heater schematic shown in Figure 6–1, the circuit consists of voltage-dropping resistor R130, the heater of V106 shunted by current-balancing resistor R129, the heaters of V101 and V105 in series-parallel, followed by the heaters of V102, V103, V104, and current-balancing resistor R126 in series-parallel. For 14-volt operation, the 28-volt circuit is separated at its voltage mid-point (junction of V101, V105, and V106 heaters) to obtain two 14-volt heater circuits with a minimum of internal wiring changes. R129 and R130 are not used in the 14-volt circuit. C142, C143, C145, C146, C147, C148, C149, C150, and C152 (28-volt circuit only) are heater r-f bypass capacitors.

Modulator Assembly. As shown in Figure 4–1, the modulator assembly employs two low-current and five power a-f transistors. The modulator circuit consists of a first a-f amplifier, a second a-f amplifier, an a-f driver amplifier, and a push-pull modulator. A transient-limiting circuit consisting of a Zener diode and an a-f power transistor is included on the modulator chassis. The function of the circuit is to protect the transistors by detecting and limiting any positive transients appearing in the primary power source.

The audio signal from the microphone is amplified by two stages of amplification, Q301 and Q302, and then fed to push-pull driver amplifier Q303 and Q304. The output of the driver amplifier is transformer-coupled to push-pull modulator Q305 and Q306. The a-f output of Q305 and Q306 is coupled to modulation transformer T102. The output of the T102 secondary is connected between the high-voltage supply and the plates and screens of r-f output stage V106 to accomplish amplitude modulation of the r-f carrier. The individual circuits in the modulator assembly are described in the following paragraphs.

FIRST A-F AMPLIFIER. A 2N585 n-p-n transistor, Q301, connected in a common-emitter circuit, is used as the first a-f amplifier (see Figure 6–1). The voice output of the microphone is applied through potentiometer R301 and C301 to the base of Q301. The a-f signal is amplified by Q301 and directly coupled to the base of second a-f amplifier Q302.

MIC control R301 is used to adjust the over-all gain of the modulator and to establish proper d-c operating current for the microphone. R301 is connected to a regulated low-voltage supply of 10 volts, furnished by Zener diode CR301 and voltage-dropping resistor R308. R302 and R303 form a voltage divider network to provide operating bias for the base of Q301. R304 is the emitter load resistor, and C302 is the emitter a-f bypass capacitor. R305 is used in the common-emitter circuit to provide the required amount of negative feedback for good stability. R306 serves as the collector resistor for Q301 as well as the base resistor of Q302.

SECOND A-F AMPLIFIER. A 2N217 p-n-p transistor, Q302, connected in a common-collector circuit, is used as the second a-f amplifier. The second stage is direct-coupled to the first a-f amplifier to utilize the complementary properties of n-p-n and p-n-p transistors. The a-f signal is amplified by Q302 and then coupled by push-pull input transformer T301 to a-f driver amplifier Q303 and Q304. The emitter load is the primary winding of T301. The network consisting of R307 and C303 is used to decouple the emitter circuit from the regulated 10-volt supply.

A-F DRIVER-AMPLIFIER. Two 2N375 p-n-p power transistors, Q303 and Q304, connected in a push-pull common-collector circuit, are used as the a-f driver-amplifier. The a-f signal is amplified by Q303 and Q304 and then coupled by input transformer T302 to push-pull modulator Q305 and Q306. Q303 and Q304 are connected for Class B operation, with their bases and emitters returned to the low-voltage supply through the center-tapped windings of T301 and T302, respectively, and series resistor R309. Under no-signal conditions, since the bases and emitters are connected to the same d-c supply source, no operating current is drawn. As an a-f signal is applied, the operating current increases. R309 is used as a clipping resistor. As the operating current increases, the voltage drop across R309 increases, limiting the current swings of the transistors and thus clipping peak a-f signals. The value of R309 is chosen so that, with the adjustment of MIC control R301, the modulation of the r-f carrier will not exceed 95%. The collectors of Q303 and Q304 are returned to ground through normally conducting transient limiter Q307.

PUSH-PULL MODULATOR. Two 2N375 p-n-p power transistors, Q305 and Q306, connected in a push-pull common-collector circuit, are used for the modulator. The a-f output of Q305 and Q306 is connected to transformer T102, which is used to modulate the r-f output of push-pull power amplifier V106. Q305 and Q306 are also connected for Class B operation, with their bases and emitters returned to the low-voltage supply through the center-tapped windings of T302 and T102, respectively. C305 and C306 are neutralizing capacitors used to prevent self-oscillation of the push-pull circuit at a high audio frequency. The collectors of Q305 and Q306 are returned to ground through normally conducting transient limiter Q307. The primary winding of modulation transformer T102 is connected to the emitters of Q305 and Q306, with the primary center-tap returned

to the low-voltage supply. Plate modulation is accomplished by connecting the secondary winding of T102 between the high-voltage supply and the plate tank circuit of V106. Screen modulation is accomplished by connecting the screen grids of V106 to a voltage divider (R124 and R125) connected across the secondary of T102. The tertiary winding of T102 is used to furnish sidetone voltage (refer to *Sidetone Circuit* discussed previously).

TRANSIENT-LIMITING CIRCUIT. A transient-limiting circuit, consisting of transient limiter Q307 and transient detector CR302, is used to protect Q303, Q304, Q305, and Q306 from overload due to the appearance of positive transients on the aircraft's low-voltage supply. A 2N176 p-n-p power transistor, Q307, is used for the transient limiter, and a 1N1364A 36-volt Zener diode, CR302, is used for the transient detector. Under normal operating conditions, the collectors of Q303, Q304, Q305, and Q306 are returned to ground through the emitter-collector circuit of Q307, which is normally conducting. Q307 is connected in a common-collector circuit, with the base returned to the grounded collector through R310. CR302 is connected between the low-voltage supply and the junction of R310 and the base of Q307. CR302 is connected with reverse polarity so that it does not conduct under normal operating conditions. When a positive transient exceeding the 36-volt Zener (breakdown) voltage of CR302 appears on the low-voltage supply, CR302 conducts. The resultant voltage drop across R310 cuts off Q307 for the length of time that the transient exceeds 36 volts. In this manner, the collectors of Q303, Q304, Q305, and Q306 are open-circuited for the duration of any positive pulse exceeding 36 volts, thus protecting the transistors from overload.

4–6. DV-12A DYNAVERTER.

Functional Description. The ARC Type DV-12A Dynaverter is a transistorized power converter. Low-voltage dc from a primary source is applied to two high-power transistors connected in a self-excited multivibrator switching circuit. This circuit furnishes reversing-polarity, square-wave pulses to the primary winding of a specially designed transformer. The secondary winding of the transformer provides a square-wave alternating current that is rectified and filtered to provide a d-c output at the desired voltage. The magnitude of this voltage depends on the primary-secondary turns ratio of the transformer. The transformer also has two feedback windings to control the transistor switching action.

Principles of Operation. A schematic diagram of the basic inverter circuit is shown in Figure 4–5. Assume that at the instant the circuit is energized a slight imbalance in Q1 and Q2 causes more current to flow in winding 3 than in winding 2 of T1. The flux in the transformer core begins to change toward saturation in one direction at a linear rate, since the product of the flux rate of change and the number of turns must equal the battery voltage (neglecting the small back voltage due to the IR drop).

The change in flux induces voltages in windings 1 and 4, making them positive at A and B. The base of Q2, therefore, becomes negative with respect to its emitter, and the base of Q1 becomes positive with respect to its emitter. Under these conditions, Q2 becomes saturated (low resistance from emitter to collector) and Q1 is cut off (high resistance from emitter to collector).

When Q2 is saturated, almost all of the input voltage appears across winding 3, and the flux in the core of the transformer increases until saturation occurs. When the core becomes saturated, the flux ceases to change. Consequently, the induced voltages in windings 1 and 4 drop to zero, causing Q2 to cut off and the current in winding 3 to decrease.

The decrease of current in winding 3 causes a decrease of flux in the core of the transformer. This change of flux induces voltages of such polarity in windings 1 and 4 that they become negative at A and B. As a result, Q2 cuts off completely, Q1 becomes saturated, and current increases in winding 2 until saturation of the core occurs in the opposite direction. During this time, the voltages induced in windings 1 and 4 keep Q2 cut off and Q1 saturated. When the core of the transformer becomes saturated, the switching again takes place.

The switching action of the transistors continues to repeat. Current flows alternately in windings 2 and 3, inducing a square-wave alternating voltage in winding 5 of the transformer. The frequency of the alternating wave output depends on the applied d-c voltage, the

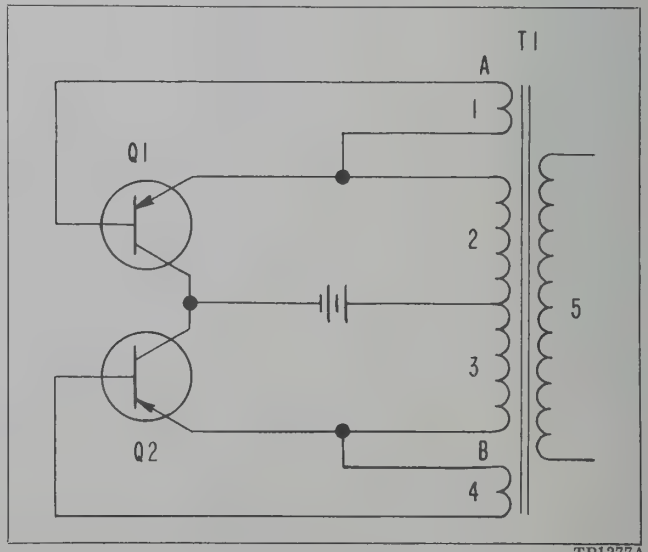


Figure 4–5. Basic Transistor Inverter Circuit

number of turns in the primary winding, the cross-sectional area of the core, and the saturation flux density of the core material. The Dynaverter operates at about 1000 cps.

The schematic diagram of the DV-12A Dynaverter is shown in Figure 6–12. Basically, the circuits for the 14-volt and the 28-volt models are the same. Because of the different input voltages, however, the transistors, resistor values, and turns ratios of the transformers are different. In addition, for the 28-volt model, a low-pass filter consisting of L401 and C403 is used to prevent possible transistor damage due to input power transients. Because of the lower primary voltage in the 14-volt model, only a capacitor (C403) is required. In both models, C404 is used as a filter capacitor and R405 as a bleeder resistor for the high-voltage output.

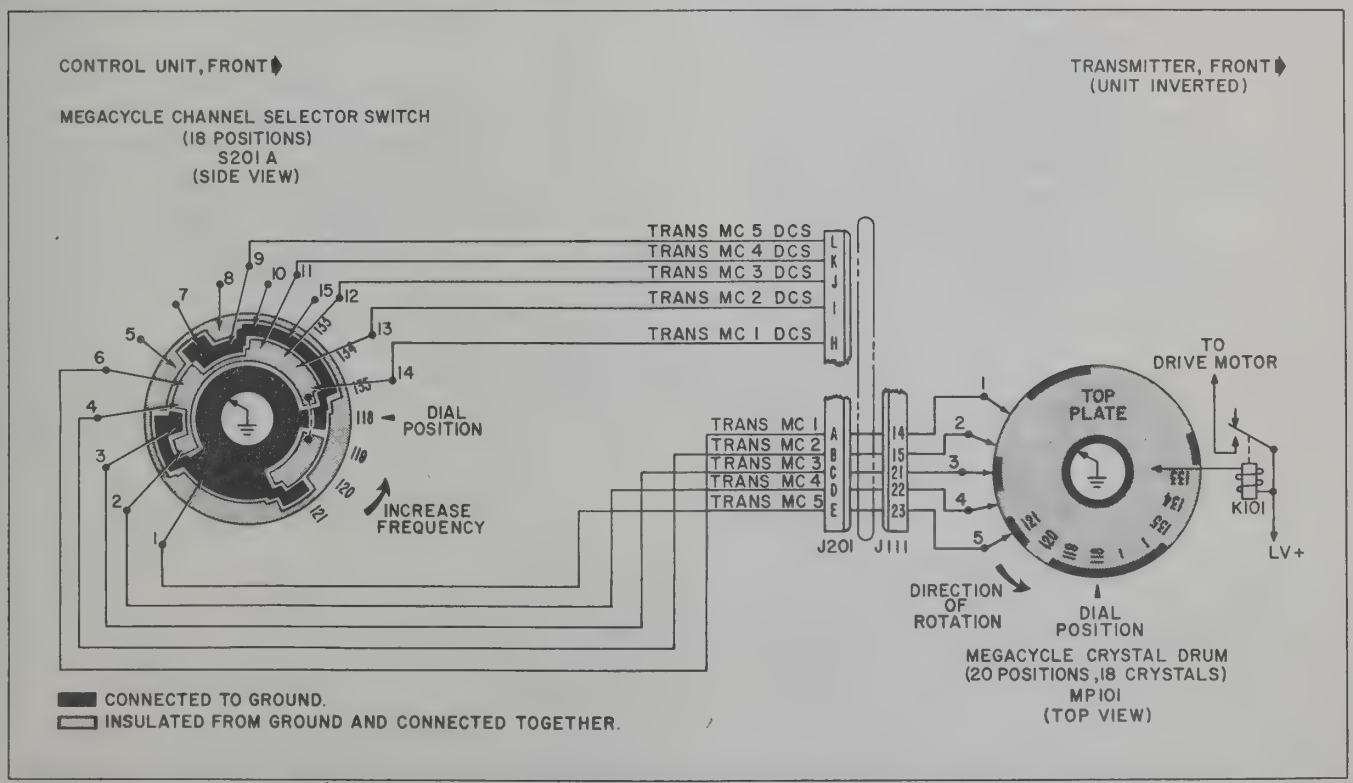
4–7. C-82A CONTROL UNIT.

The C-82A Control Unit includes a primary power switch (ON-OFF), a megacycle channel selector switch, and a fractional megacycle channel selector switch. When the power switch is set to the ON position, primary power is applied to K104 in the T-25A Transmitter. K104, in turn, applies primary power to the transmitter.

Megacycle channel selector switch S201A is a geared, 18-position, printed-circuit, revolving drum assembly which selects one of 18 crystals on the transmitter megacycle crystal drum, without stopping on the two blank spaces on the drum. The method of channel selection is described in paragraph 4–3. Fractional megacycle channel selector switch S201B is a geared, 20-position, printed-circuit, revolving drum assembly which selects one of 20 crystals on the fractional megacycle crystal drum. The binary code employed to meet these switching requirements uses five control wires per crystal drum, and its switching sequence is shown in simplified schematic form in Figure 4–3. The code can be described as two re-entrant, ten-digit codes which are also re-entrant with each other to form a twenty-digit code, with the further characteristic that two digits can be removed and re-entrance maintained.

A simplified schematic diagram of the control circuit for megacycle channel selector switch S201A is shown in Figure 4–6. The circuit is shown locked in the 118-mc position. Rotation of S201A to any new position, for example 121 mc, will cause latching relay K101 and the drive motor circuit to be energized. Megacycle crystal drum MP101 will rotate until its switching code agrees with the code of the master selector switch, at which point open-circuit conditions will be reached, and the drum will be locked in the 121-mc crystal position.

The circuit, as described, applies to the T-25A in the SCS (single-channel simplex) mode of operation, i.e., transmitter operating on the same frequency as the receiver. If the optional feature of SCS-DCS operation is desired (refer to paragraph 2–5), an SCS-DCS switch is added to the channeling system (see Figures 2–13, 2–14, and 2–16). When the switch is set to the DCS



TP1761

Figure 4–6. Megacycle Channel Selector Switch Control Circuit, Simplified Schematic Diagram

(double-channel simplex) mode of operation, the five transmitter megacycle drum control leads are transferred from one set of wipers on the master selector switch to a second set of wipers located six positions (6 mc) ahead of the SCS position. This change in the switching code causes the transmitter megacycle crystal drum to rotate until it aligns itself with the new master switch position. In the DCS mode of operation, the transmitter operates 6.0 mc above the receiving frequency; however, the channel frequency dial (MC) on the C-82A Control Unit always indicates the receiving frequency.

A simplified schematic diagram of the control circuit for fractional megacycle channel selector switch S201B is shown in Figure 4–7. The circuit is shown locked in the .00-mc position. Rotation of the master selector switch to any new position, for example .85 mc, will cause latching relay K102 and the drive motor circuit to be energized. Fractional megacycle crystal drum MP102 will rotate until its switching code agrees with that of the master selector switch, at which point open-circuit conditions will be reached, and the drum will be locked in the .85-mc position.

Edge-lighting of the C-82A controls and panel designations is provided by two midget, flange-base lamps, DS201 and DS202, installed in red-filter light assemblies on the plastic front panel. Power to these lamps is controlled by the aircraft's panel light control.

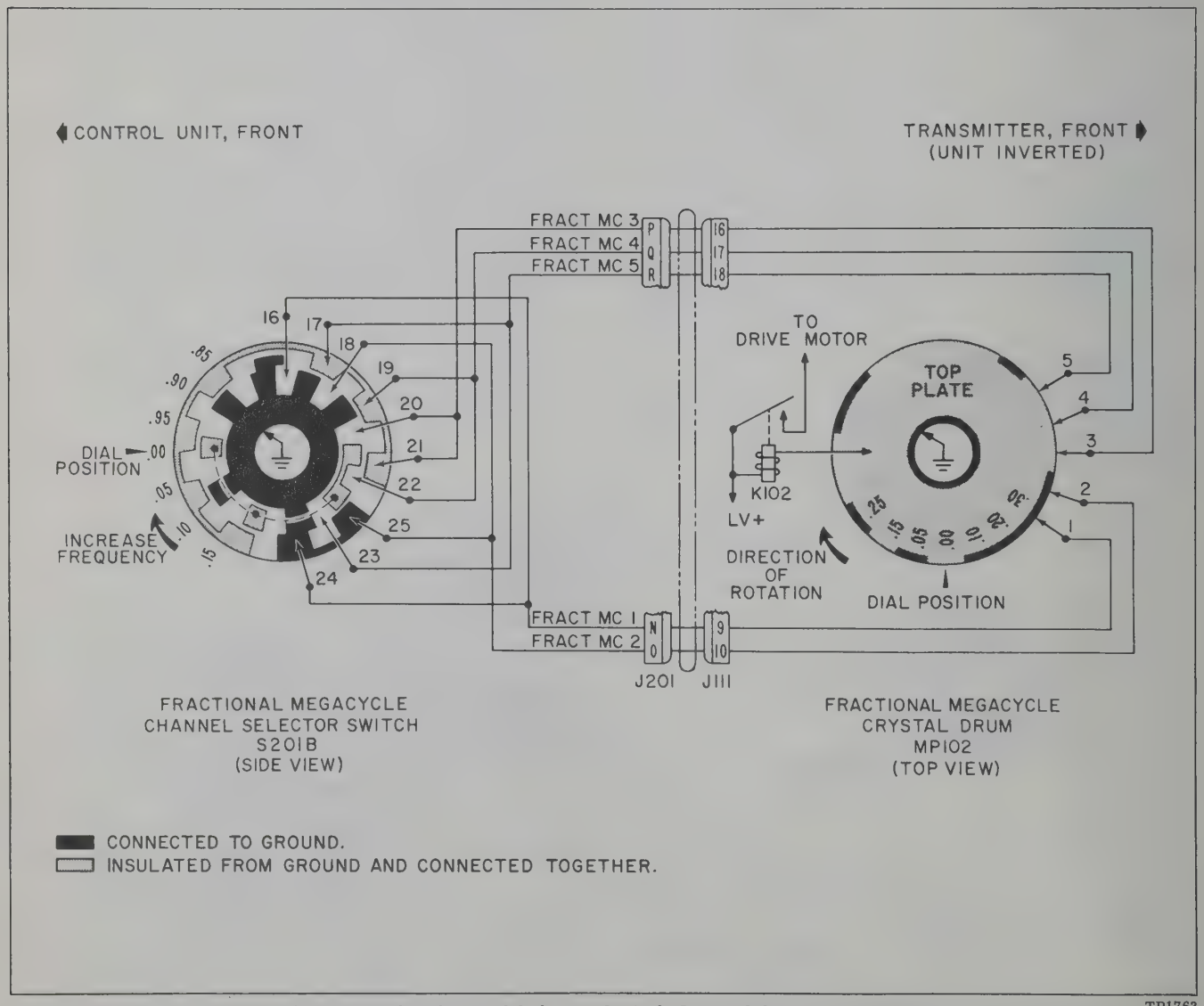


Figure 4–7. Fractional Megacycle Channel Selector Switch Control Circuit, Simplified Schematic Diagram TP1763

SECTION V
MAINTENANCE

5–1. INTRODUCTION.

WARNING

Voltages are present in this equipment which are dangerous and which may be fatal if contacted. Observe all safety precautions.

This section contains maintenance data for the T-25A Transmitter, DV-12A Dynaverter, and C-82A Control Unit. Included are a list of the test equipment required for maintenance; removal and replacement procedures; over-all performance checks; trouble analysis information; alignment and adjustment procedures; and voltage and resistance measurements. To help locate and identify individual parts, interior views (Figures 5–14 through 5–21) of the units and major assemblies are also included in this section. Complete schematic and wiring diagrams of the units are included in Section VI.

Caution

If the T-25A dust cover is removed, be sure to replace all attaching screws when reinstalling the cover. These screws must be in place for adequate heat dissipation.

5–2. TEST EQUIPMENT.

Table 5–1 lists the test equipment required for maintenance of the T-25A; equivalent test equipment may be substituted. Use of the ARC Type BTK-25A Bench Test Kit (see Figure 5–7) is recommended to facilitate performing all procedures. The BTK-25A includes an ARC Type H-25A Transmitter Test Unit, an ARC Type P-12 Power Unit with ARC Type DV-10A Dynaverter, and all necessary interconnecting cable assemblies for the test and alignment procedures. If a BTK-25A is not available, other test equipment, shown in Figure 5–8, is required.

5–3. REMOVAL AND REPLACEMENT PROCEDURES.

Caution

To prevent damaging the miniature parts of the transmitter and modulator assemblies, handle each assembly by the external framework only.

Removal and Replacement of Modulator Assembly. To remove the modulator assembly, remove the dust cover, invert the T-25A, and loosen the four captive screws located at the corners of the main chassis. Using a gentle rocking motion to free the modulator from its chassis connector, lift the modulator assembly from the T-25A. To replace the modulator assembly, reverse the procedure.

Replacement of Electron Tubes. All electron tubes used in the T-25A are located in the transmitter assembly (see Figure 5–1). With the exception of V105 and V106, the electron tubes are subminiature types and are accessible with the removal of the dust cover. Wherever possible, the insulated terminals connected to subminiature tubes are color coded in accordance with EIA color code standards. The subminiature tubes are soldered in position and mounted in individual metal tube clamps. If a subminiature tube is replaced, the new tube should be oriented and its leads routed as nearly like the original installation as possible. Do not precut the leads before installation, keep the spacing between leads at least $\frac{1}{16}$ inch, and use a minimum amount of solder. A wiring diagram of the tubes showing proper orientation and lead routing is shown in Figure 5–2. For access to plug-in type tubes, V105 and V106, invert the T-25A and remove the modulator assembly as described in the preceding paragraph.

Note

If new tubes are installed, it is not necessary to realign the T-25A.

Replacement of Transistors. The seven transistors used in the T-25A are located in the modulator assembly (see Figure 5–3). Two low-current type transistors, Q301 and Q302, soldered in position on the modulator printed-circuit panel, are accessible with the removal of the T-25A dust cover. The other five transistors, Q303 through Q307, are plug-in power types, which are accessible only when the modulator assembly is removed and inverted. To remove Q303, Q304, Q305, or Q306, remove the metal clamping plate securing the transistors to the modulator chassis, and remove the desired transistor. The transistor cases (collectors) are isolated from the chassis by an insulated plate. (It is not necessary to disconnect the flexible lead attached to the metal clamping plate.) If all four transistors are removed, be sure to place the insulated plate in position before reinstalling the transistors. Q307 is not insulated from the chassis and can be replaced without disturbing the others. Before

mounting a replacement power transistor, apply a thin coating of Dow-Corning 4 Compound to the underside of the transistor.

If it is necessary to replace Q301 or Q302, the new transistor should be oriented and its leads routed as nearly like the original installation as possible (see Figure 5–3). Prior to installing the replacement transistor, each lead should be cut to penetrate the thickness of the printed-circuit panel only. When soldering the replacement unit, hold the transistor lead with pliers between the solder joint and the transistor to form a heat sink and prevent excessive heat from damaging the transistor. Do not remove the pliers until the heat from the soldered joint has been dissipated.

Caution

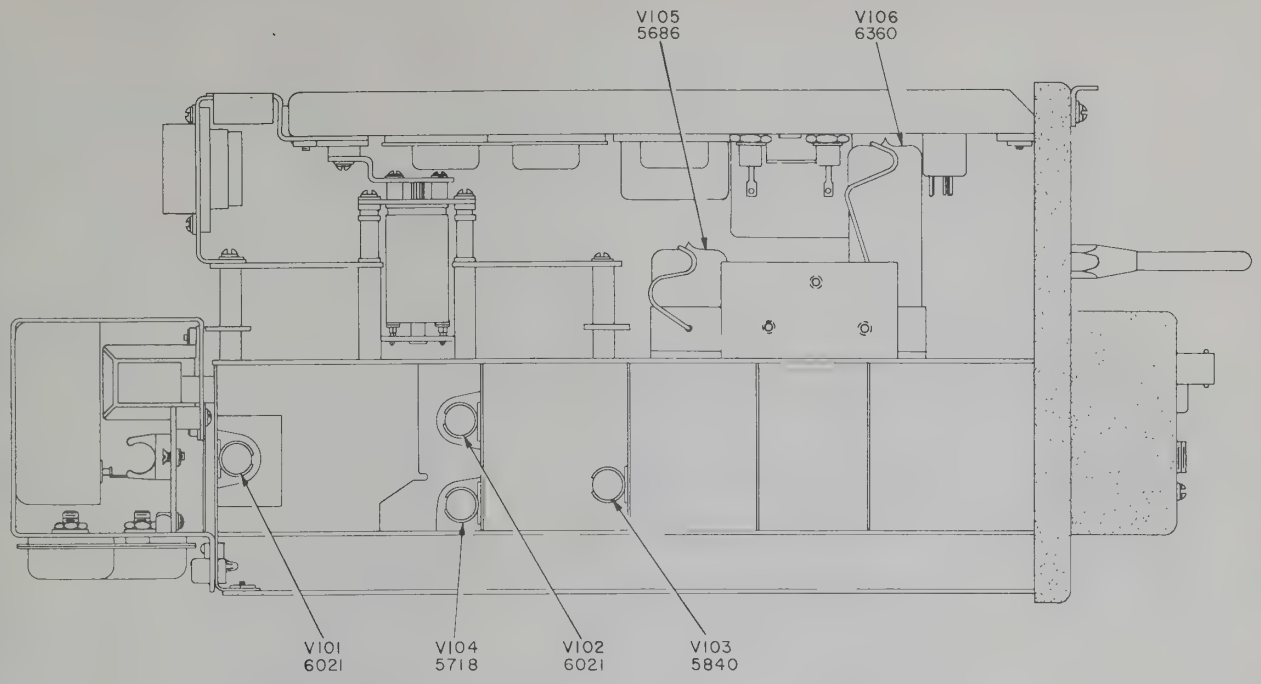
In soldering a transistor lead to the printed-circuit panel terminal, use a small amount of solder, otherwise excess solder may flow through the terminal and short circuit the panel to the modulator base plate.

Replacement of Crystal Diodes. The T-25A contains four crystal diodes: two are stud-mounted Zener diodes, CR301 and CR302, located on the modulator assembly (see Figure 5–3), and the other two are crystal diodes, CR101 and CR102, located in the front panel antenna relay housing and on the rear connector bracket assembly, respectively (see Figure 5–15). If replacement of CR101 or CR102 is required, the new diode must be correctly polarized and its leads routed as nearly like the original installation as possible. When soldering the replacement unit, hold the diode lead with pliers between the solder joint and the diode to form a heat sink during soldering and prevent excessive heat from damaging the diode. Do not remove the pliers until the heat from the soldered joint has been dissipated.

TABLE 5–1. TEST EQUIPMENT

Qty	Name	Designation	Characteristics
1	Audio Oscillator	Hewlett-Packard Model 200AB	——
1	Bench Test Kit	ARC Type BTK-25A	——
1	Control Unit [1] [2]	ARC Type C-82A	——
1	Dynaverter [3]	ARC Type DV-10A	——
		ARC Type DV-11A	——
		ARC Type DV-12A(14V)	——
		ARC Type DV-12A(28V)	——
	Dynamotor [3]	ARC Type D-10A(14V)	——
		ARC Type D-10A(28V)	——
1	Headset	ARC-11935	——
1	Linear Detector [4]	——	(See Figure 5–9)
1	Microphone	ARC-11937	Carbon, single-button
1	Multimeter	Simpson Model 260 or Weston Model 564	20,000 ohms/volt or 1000 ohms/volt
1	Oscilloscope [4]	Tektronix Type 310	——
1	Primary Power Supply	——	14- or 28-volt dc rectifier or storage battery
1	R-f Wattmeter	Bird Electronic Model 61	51.5 ohms, 15 watts
1	Tuning Wand	——	Teflon wand equipped with iron and brass tips
1	Vacuum Tube Voltmeter	Hewlett-Packard Model 410B	——
1	Vacuum Tube Voltmeter [1]	Ballantine Model 300	——
1	Wrench	Bristol No. 4	——

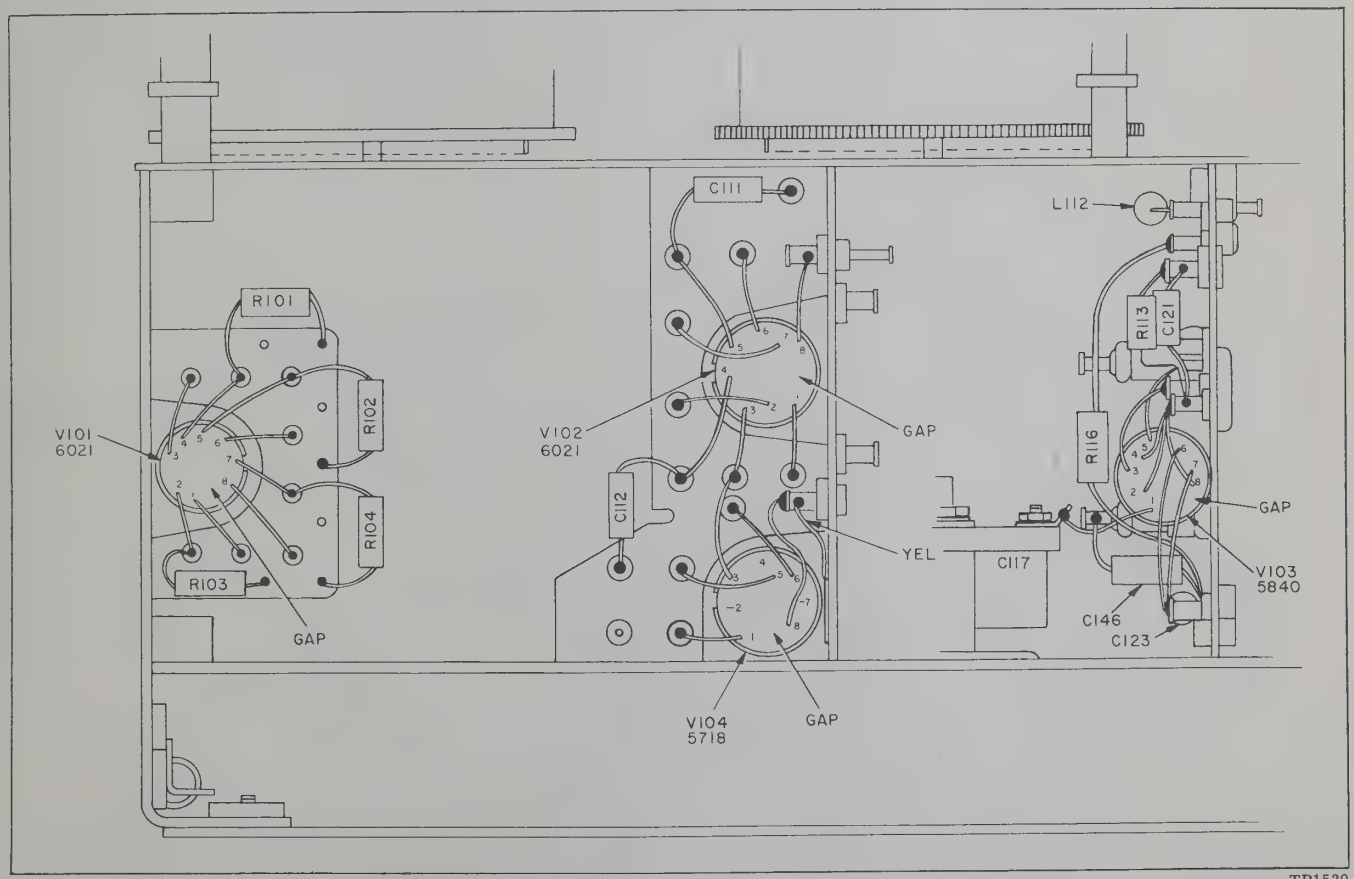
[1] Required only when an ARC Type BTK-25A Bench Test Kit is not available.
[2] In place of the C-82A, either Channel Selector Switch ARC-20730 or ARC Type CC-10A Custom Control Unit (ARC-24020), and a power on-off switch, may be used.
[3] High voltage for the T-25A is obtained from a Dynaverter or a dynamotor of the correct input voltage rating. The DV-12A is mounted on the rear of the T-25A. The other Dynaverters or dynamotor may be installed on an associated ARC vhf receiver or on an ARC Type P-12 Power Unit.
[4] Optional equipment. Refer to *Modulator* in paragraph 5–7.



NOTE: UNIT SHOWN INVERTED. FOR WIRING OF V101, V102, V103, AND V104, SEE FIGURE 5-2.

TP1537A

Figure 5–1. T-25A Transmitter, Location of Electron Tubes



TP1539

Figure 5–2. Wiring of V101, V102, V103, and V104

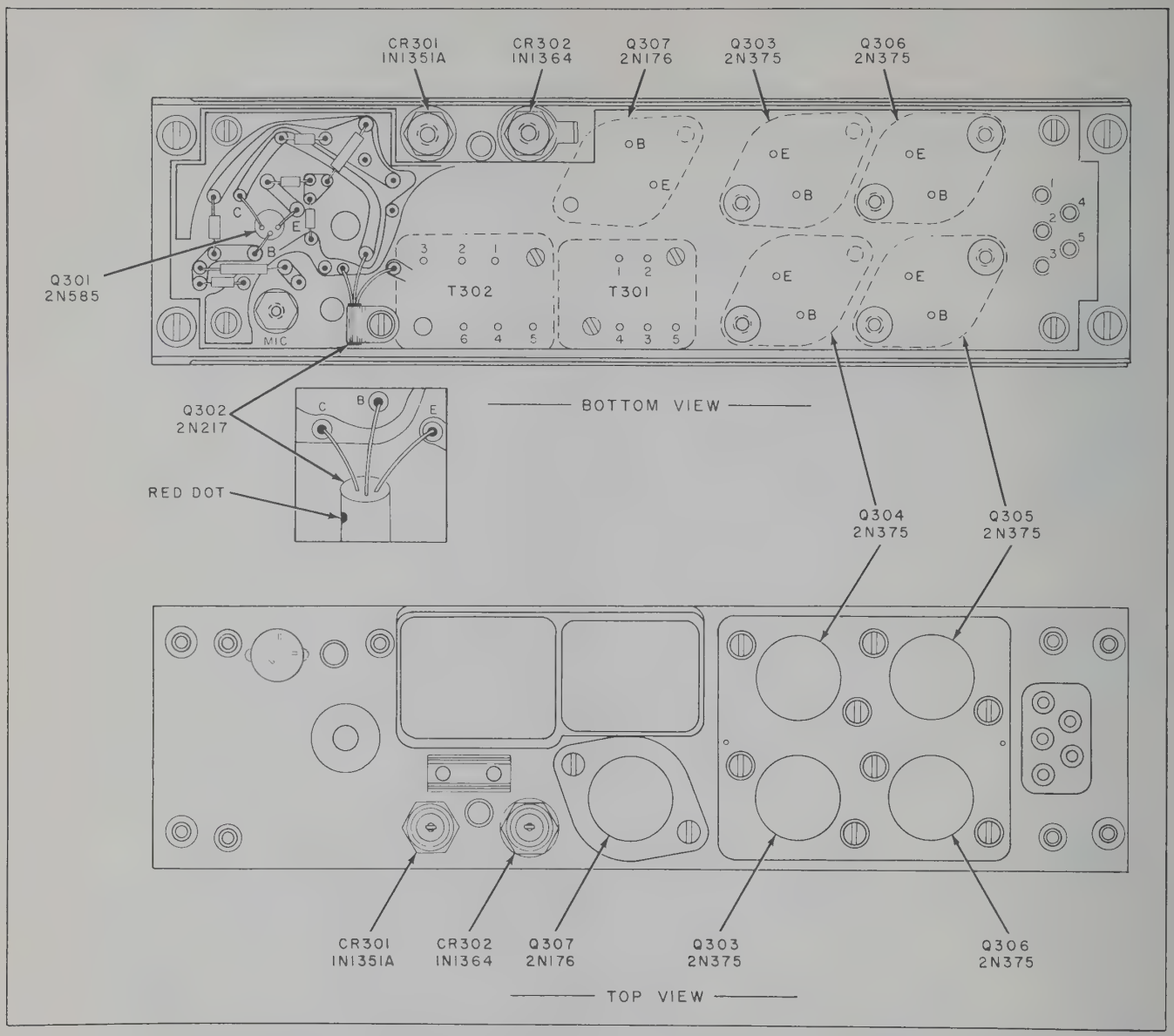


Figure 5–3. Modulator Assembly, Location of Transistors and Diodes

TP1541

Replacement of Crystals. To replace any of the T-25A megacycle or fractional megacycle crystals, proceed as follows:

Step 1. Invert the T-25A and remove the modulator assembly as described previously.

Step 2. Disconnect plugs P101, P102, and P103 from the tuner assembly (see Figure 5–4).

Step 3. Remove the two screws located at the rear corners of the T-25A which fasten the connector bracket assembly to the main frame.

Step 4. Remove the four screws which secure the connector bracket assembly to the gearing assembly. Displace the connector bracket assembly and its cabling.

Step 5. Loosen the two screws holding the gearing assembly to the transmitter frame, and remove the gearing assembly by gently pulling straight up.

Step 6. Remove the two tuner assembly mounting screws, located at the front corners of the tuner assembly, and the gearing assembly mounting post.

Step 7. Remove the tuner assembly to expose the crystal drums.

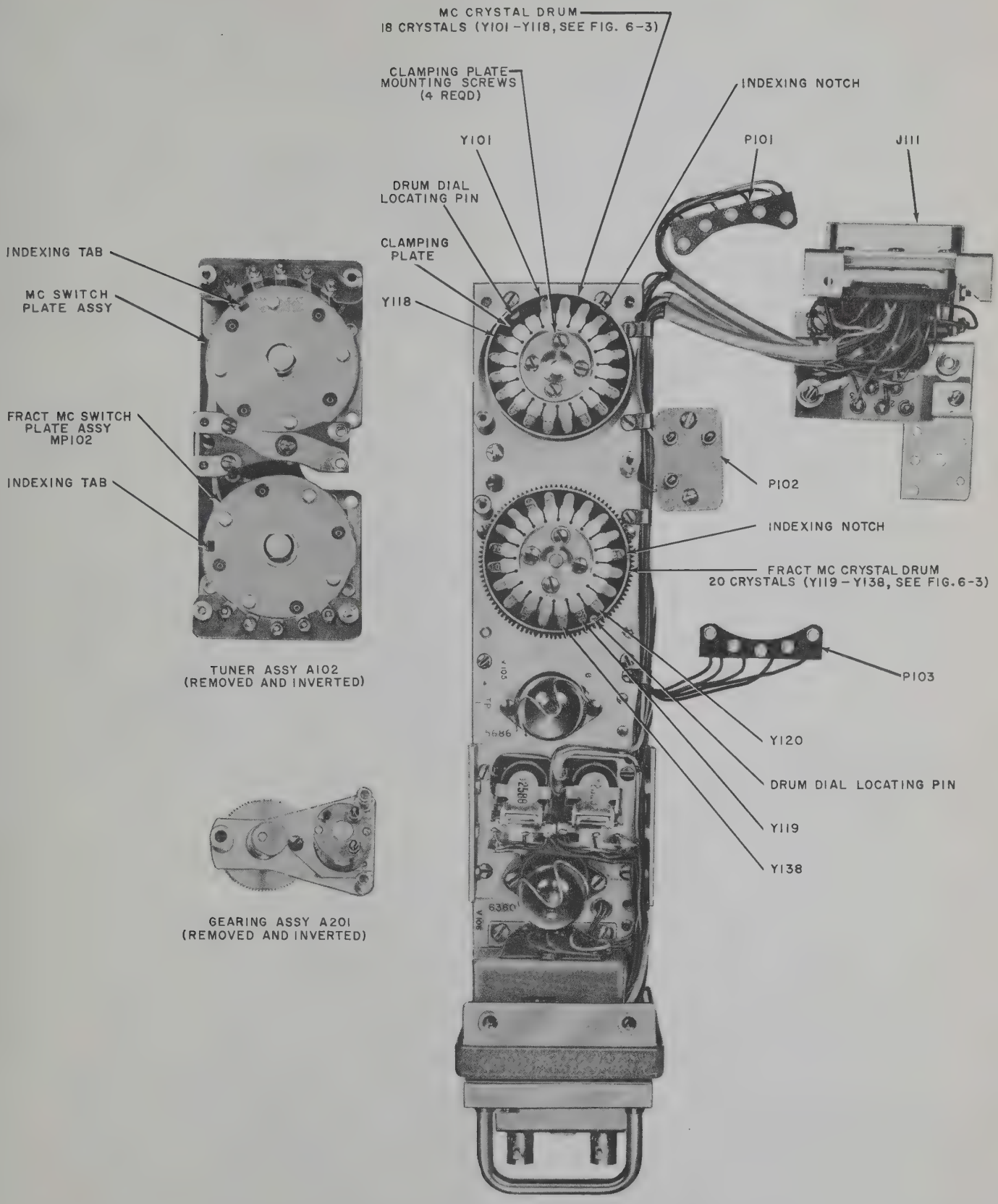
Step 8. Remove the four screws which hold the crystal clamping plate and remove the plate.

Step 9. Using tweezers or long nose pliers, remove the desired crystal from its socket.

Step 10. Before installing the replacement crystal, check that the frequency is correct and that the pins are straight and parallel.

Step 11. Install the replacement crystal.

Step 12. Reinstall the crystal clamping plate, checking that each crystal is correctly positioned under its segment of the clamping plate.



TP1350

Figure 5–4. T-25A Transmitter, Tuner Assembly A102 Removed

Step 13. Reinstall the tuner assembly. Make sure the indexing tab on each tuner switch plate assembly mates with the indexing notch located on each crystal drum.

Caution

Failure to index the crystal drum properly with the tuner assembly tab will cause improper operation.

Step 14. Before reinstalling the gearing assembly, check that the drive-pawl levers of the tuner assembly are latched and that each latching spring is properly placed under the lip of the relay armature (see Figure 5–11).

Step 15. Reinstall the gearing assembly.

Note

When reinstalling the gearing assembly, position the gearing assembly drive cam so that it does not interfere with the drive-pawl levers of the tuner assembly.

Step 16. Reinstall the connector bracket assembly.

Step 17. Reconnect P101, P102, and P103.

Step 18. Check the transmitter output frequency for compliance with FCC regulations.

Replacement of Panel Lamps in C-82A Control Unit. The C-82A Control Unit uses either two type 327 (28-volt) or 330 (14-volt) midget, flange-base panel lamps. To replace a lamp, proceed as follows:

Step 1. Unscrew and remove the lamp housing assembly.

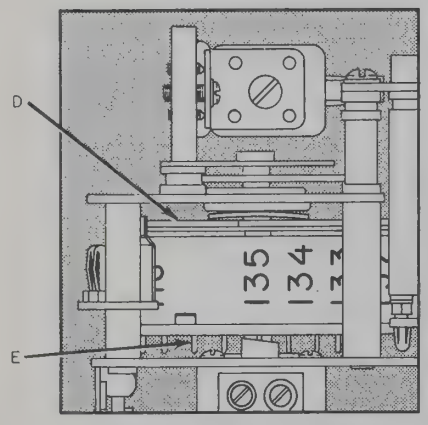
Step 2. With the thin edge of a knife blade or with the fingernails of the thumb and forefinger inserted between the flange base of the lamp and threaded bushing, withdraw the defective lamp.

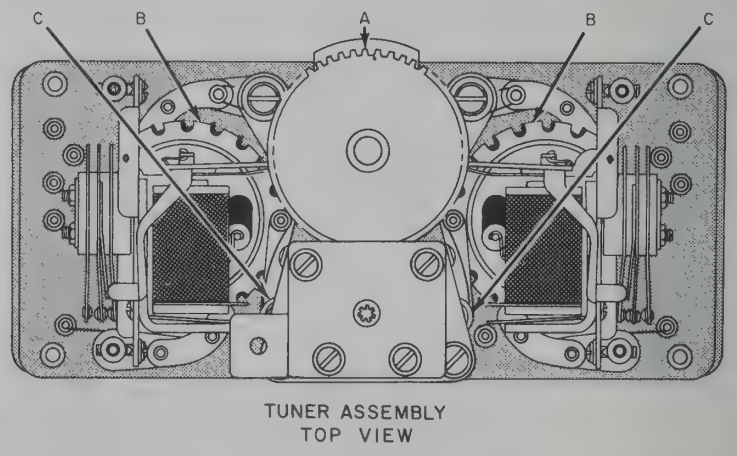
Step 3. Insert a new lamp, seating the flange of the base firmly against the threaded bushing.

Step 4. Replace the lamp housing assembly and screw in finger-tight.

5–4. LUBRICATION.

The gears and bearings of the tuner assembly and gearing assembly of the T-25A should be lubricated in accordance with information given in Figure 5–5. The gears and bearings of the channel selector switches in the





Point of Lubrication	Part to be Lubricated	Lubrication Period (hours)	Lubricant	Application
A	Drive Motor Spur Gears	500	Aeroshell No. 7 Grease	Apply small amount to several teeth on both gears.
B	Indexing Plate Notches and Ratchet Teeth	500	Aeroshell No. 7 Grease	Apply small amount to several notches and teeth of each tuner assembly.
C	Lever Arm Post Bearing	500	Aeroshell No. 7 Grease	Apply small amount.
D	Switch Plate Contact Surface	500	Dow-Corning 510 Silicone Fluid	Apply small amount to several points on the switch plate contact surface of each tuner assembly with artist's brush.
E	Crystal Pins	500	Dow-Corning 510 Silicone Fluid	Apply small amount to several crystal pins of each tuner assembly with artist's brush.

Figure 5–5. T-25A Transmitter, Lubrication Chart

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C-82A Control Unit (or equivalent Channel Selector Switch ARC-20730 or ARC Type CC-10A Custom Control Unit) should be lubricated in accordance with information given in Figure 5–6.

5–5. OVER-ALL PERFORMANCE CHECKS.

General. Table 5–2 outlines procedures for checking the over-all performance characteristics of the T-25A. The test equipment required is listed in Table 5–1. Two optional bench test set-ups may be used for performing these tests: the bench test set-up using an ARC Type BTK-25A Bench Test Kit is shown in Figure 5–7; the bench test set-up without the use of an ARC Type BTK-25A Bench Test Kit is shown in Figure 5–8.

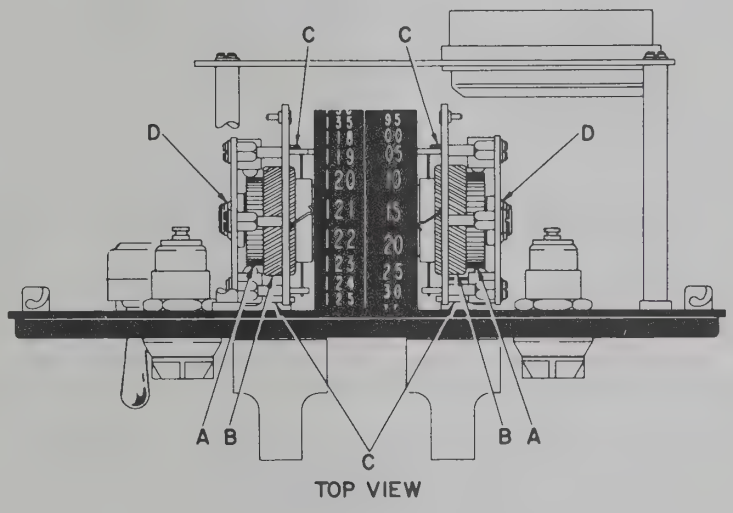
Test Conditions. The following test conditions are used, unless specified otherwise:

Input voltage: 13.75 volts dc (for 14-volt models) or 27.5 volts dc (for 28-volt models) as measured on the test set-up voltmeter.

Sidetone output termination: 300 ohms noninductive, provided in the H-25A Transmitter Test Unit of the BTK-25A and required in the test set-up without BTK-25A (see Figure 5–8). (Parallel loads, such as a headset, must not be connected to the PHONE jack of either test set-up during sidetone output measurements.)

Transmitter load: During all transmitter tests, a 10-watt (minimum), 52-ohm dummy load must be connected to the T-25A ANT jack.

Warm-up: At least 5 minutes prior to measurements.



Caution

Keep oil and grease away from spring contacts and printed circuit contact plates, otherwise intermittent operation may result.

Point of Lubrication	Part to be Lubricated	Lubrication Period (hours)	Lubricant	Application
A	Detent Gear	500	Aeroshell No. 7 Grease	Apply thin coat to gear teeth with artist's brush.
B	Bevel Gear	500	Aeroshell No. 7 Grease	Apply thin coat to gear teeth with artist's brush.
C	Control Shaft Bearing	500	Pioneer No. 10 Oil	Invert unit and apply one drop to each bearing.
D	Drum Shaft Bearing	500	Pioneer No. 10 Oil	Apply one drop to each bearing.

Figure 5–6. C-82A Control Unit, Lubrication Chart

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TABLE 5–2. OVER-ALL PERFORMANCE CHECKS

Step	Procedure With BTK-25A	Procedure Without BTK-25A	Normal Indication
	PRELIMINARY PROCEDURE		
1	Set LV power switch OFF, PWR RELAY switch OFF, TRANS KEY switch OFF, WHISTLE-THROUGH switch OFF, CONTROL switch to INT or EXT (as required), MOD CAL control full counterclockwise.	Set TRANS KEY and WHISTLE-THROUGH switches OFF. Set C-82A power switch OFF.	None.
2	Interconnect equipment as shown in Figure 5–7. **Caution** R-f wattmeter and cable between RF IN connector on test unit and ANT connector on T-25A must be connected, otherwise V106 in T-25A will be damaged when the transmitter is keyed.	Interconnect equipment as shown in Figure 5–8. **Caution** R-f wattmeter must be connected to T-25A ANT connector, otherwise V106 in T-25A will be damaged when the transmitter is keyed.	None.
3	Set d-c meter switch to 0-40V. Set LV POWER switch ON (green lamp will light). Apply primary power to T-25A by setting PWR RELAY switch ON (red lamp will light) or, if C-82A is connected, set C-82A power switch ON (red lamp will also light for external control).	Apply primary power by setting C-82A power switch ON.	None.
4	Adjust primary power supply to 13.75 or 27.5 volts dc as read on d-c meter, depending on voltage rating of equipment. Allow equipment to warm up for approximately 5 minutes.	Same as with BTK-25A.	Meter reads as noted.
5	Set d-c meter switch to 0-400V.	Read HV voltmeter.	Meter indicates no-load output of HV power supply.
	CHANNELING PERFORMANCE		
1	Perform the preliminary procedure outlined previously in this table.	Same as with BTK-25A.	None.
2	Operate the megacycle channel selector switch to select each megacycle channel and then the fractional megacycle channel selector switch to select each fractional megacycle channel, and observe the T-25A crystal drums for correct positioning.	Same as with BTK-25A.	Crystal drums index to selected frequency.
3	Adjust primary power supply to 10.0 volts dc for 14-volt equipment or 20.0 volts dc for 28-volt equipment, as indicated on d-c meter, and repeat Step 2.	Same as with BTK-25A.	As noted in Step 2.
4	Readjust primary power supply to 13.75 volts dc or 27.5 volts dc, as required.	Same as with BTK-25A.	Meter reads as noted.
	TRANSMITTER POWER OUTPUT		
1	Perform the preliminary procedure outlined previously in this table.	Same as with BTK-25A.	None.

TABLE 5–2. OVER-ALL PERFORMANCE CHECKS — Continued

Step	Procedure With BTK-25A	Procedure Without BTK-25A	Normal Indication
	TRANSMITTER POWER OUTPUT—Continued		
2	Set channel selector switches to 135.50 mc. Set TRANS KEY switch ON. Read unmodulated power output on r-f wattmeter.	Same as with BTK-25A.	Between 6 and 10 watts.
3	Repeat Step 2 for all settings of the megacycle channel selector switch and then for all settings of the fractional megacycle channel selector switch.	Same as with BTK-25A.	As noted in Step 2.
	MODULATOR PERFORMANCE		
1	Perform the preliminary procedure outlined previously in this table.	Same as with BTK-25A.	None.
2	Turn Hewlett-Packard Model 200AB Audio Oscillator on. Set a-c meter switch to AUDIO IN 0-1V. Set channel selector switches to 126.50 mc. Adjust audio oscillator frequency to 1000 cps. Press TRANS KEY switch to MOMENTARY, and adjust audio oscillator to an output of 0.5 volt as read on a-c meter. Release TRANS KEY switch.	Turn Hewlett-Packard Model 200AB Audio Oscillator on. Set AUDIO INPUT-MIC switch to AUDIO INPUT. Set MOD-SIDETONE switch to MOD. Set channel selector switches to 126.50 mc. Adjust audio oscillator frequency to 1000 cps.	None.
3	Set a-c meter switch to MOD CAL. Press TRANS KEY switch to MOMENTARY, and adjust H-25A MOD CAL control to red-line (MOD CAL) indication on a-c meter. Repeat Step 2 to check audio input setting. Reset a-c meter switch to MOD CAL, and readjust MOD CAL control to red-line indication, if required. Release TRANS KEY switch.	Set TRANS KEY switch ON. Set Ballantine Model 300 Voltmeter to read 1.0 volt full scale. Adjust audio oscillator to an output of 0.5 volt as indicated on the Model 300. Set TRANS KEY switch OFF.	None.
4	Set a-c meter switch to MOD LEVEL. Press TRANS KEY switch to MOMENTARY. Read modulation level on meter. If the reading is within the green (MOD LEVEL) sector of the a-c meter, the per cent modulation of the T-25A is satisfactory. Release TRANS KEY switch.	Set SIDETONE control on T-25A front panel full clockwise. Set Model 300 to read 10 volts full scale. Set MOD-SIDETONE switch to SIDETONE. Set TRANS KEY switch ON. Read sidetone voltage on Model 300. For satisfactory modulation level, meter should indicate at least 5.5 volts. Set TRANS KEY switch OFF.	As noted.
5	Repeat Steps 3 and 4 to check accuracy of all adjustments. **Note** Steps 3, 4, and 5 should be completed as quickly as possible to avoid shifts in calibration settings.		
6	To check sidetone voltage, set a-c switch to SIDETONE 0-10V. Set SIDETONE control on T-25A front panel full clockwise. Press TRANS KEY switch to MOMENTARY. Read sidetone voltage on a-c meter; meter reading should be greater than 5.5 volts. Release TRANS KEY switch.		

5–6. TROUBLE ANALYSIS.

Trouble-shooting Chart. Table 5–3 lists the symptoms of some possible troubles, their probable causes, and the suggested remedies or checks. The use of this table will help to localize the source of trouble, following which a point-by-point analysis may be made to determine the faulty part. To assist further in localizing trouble, reference should be made to the circuit theory discussion in Section IV and to the schematic diagrams in Section VI.

TABLE 5–3. TROUBLE-SHOOTING CHART

Symptom	Probable Trouble	Remedy or Check
	T-25A TRANSMITTER	
Tuner runs continuously or fails to channel properly.	Defective C-82A Control Unit.	Substitute other C-82A and recheck operation. If C-82A is defective, bench-test and trouble-shoot to isolate defect.
	Fault in channeling.	Refer to *Channeling Trouble Analysis* following this table.
Tuner drive motor fails to run.	Defective tuner relay K101 or K102.	Check operation of K101 and K102. Replace if defective.
Tuner motor runs and drive-pawl levers operate but crystal drum does not rotate.	Binding or abnormal loading of crystal drum and cam shaft.	Inspect crystal drum and cam shaft mechanism for binding or overload condition.
	Improper adjustment of tuner mechanism.	Refer to *Tuner Assembly* of paragraph 5–7 for tuner adjustment.
Low or no power output.	Defective power amplifier tube V106.	Replace V106.
	Defective antenna relay K103.	Check operation of K103. Replace if defective.
	Improper alignment.	Check power output as described in Transmitter Power Output of Table 5–2. If power output is low on some frequencies but normal on others, realign as described in paragraph 5–7.
	Faulty oscillator outputs.	If power output is low on all frequencies, check megacycle and fractional megacycle oscillator outputs and transmitter test point voltages and compare with values listed in Table 5–6.
Low or no sidetone output.	Modulator and sidetone circuit improperly adjusted.	Adjust modulator and sidetone circuit as described in paragraph 5–7.
Low or no modulation.	Improper adjustment of modulator.	Readjust modulator as described in paragraph 5–7. If modulator cannot be adjusted properly, or if no modulation can be observed, check modulator stage levels and compare with values listed in Table 5–6 to isolate trouble.

TABLE 5–3. TROUBLE-SHOOTING CHART—Continued

Symptom	Probable Trouble	Remedy or Check
	C-82A CONTROL UNIT	
Improper channel selection.	Defective T-25A.	Substitute other T-25A and recheck operation. If T-25A is defective, bench-test and trouble-shoot to isolate defect.
	Fault in channeling circuit.	Refer to *Channeling Trouble Analysis* following this table.
T-25A fails to operate when primary power is applied.	Defective T-25A.	Substitute other T-25A and recheck operation. If T-25A is defective, bench-test and trouble-shoot to isolate defect.
	Defective power switch S202 (ON-OFF).	Replace power switch.

Channeling Trouble Analysis. In case of improper channel selection, the following procedures will aid in localizing the trouble. One procedure is based on a test set-up using the ARC Type BTK-25A Bench Test Kit; the other uses normally available test equipment.

Channeling Trouble Analysis With BTK-25A. Interconnect the equipment and BTK-25A as shown in Figure 5–7, and perform the preliminary procedure of Table 5–2. If the trouble is in the megacycle portion of the channeling circuit, operate the megacycle channel selector switch to select all megacycle channels, and observe the TRANS CYCLING panel lamp indications on the H-25A. Compare them with the lamp indications listed in Table 5–4. If the trouble is in the fractional megacycle portion of the channeling circuit, operate the fractional megacycle channel selector switch to select all fractional megacycle channels, and observe the FRACT CYCLING panel lamp indications on the H-25A. Compare them with the lamp indications listed in Table 5–4.

If a fault is indicated by the lamps, determine whether the fault is in the C-82A channel selector switches or in the T-25A tuner assembly by substituting other units. (For the C-82A, use the channel selector switch assembly provided in the H-25A panel.) If substitute units are not available, disconnect the T-25A and C-82A, and make the continuity checks given in the tables of Figures 6–1 and 6–16.

Channeling Trouble Analysis Without BTK-25A. Interconnect the T-25A Transmitter, the C-82A Control Unit, and the test equipment as shown in Figure 5–8, and perform the preliminary procedure of Table 5–2. Operate the channel selector switches to select all megacycle channels and then all fractional megacycle channels, and observe the T-25A crystal drums for correct positioning.

If a fault is indicated, substitute a C-82A and then a T-25A for the units installed to isolate the defective unit. If substitute units are not available, disconnect the T-25A and C-82A, and make the continuity checks given in the tables of Figures 6–1 and 6–16.

TABLE 5–4. BTK-25A LAMP INDICATIONS FOR CONTINUITY CHECKS OF CHANNEL SELECTOR SWITCHES

Switch Position	TRANS CYCLING Lamps [1]	Switch Position	FRACT CYCLING Lamps [1]
118	C,E	.00	N,O
119	A,D	.05	N,O,P
120	A,B,E	.10	N,R
121	B,C	.15	N,O,P,Q
122	C,D	.20	Q
123	D,E	.25	O,P,Q,R
124	E	.30	P
125	A	.35	N,P,Q,R
126	B	.40	O
127	C	.45	O,Q,R
128	D	.50	N
129	A,E	.55	N,P,R
130	A,B	.60	R
131	A,B,C	.65	O,Q
132	A,B,C,D	.70	Q,R
133	B,C,D,E	.75	P,R
134	A,C,D,E	.80	P,Q
135	B,D,E	.85	N,Q
		.90	O,P
		.95	N,O,R

[1] Letters refer to illuminated lamps only. Letters also indicate grounded control wire terminals of J201 in C-82A.

5–7. ALIGNMENT AND ADJUSTMENT.

Note

If new tubes are installed, realignment of the T-25A is not required. Alignment should be necessary only if major parts, such as tuning capacitors, tuning inductors, or tuning arms, have been replaced. *No adjustment of the coils or tuning capacitors should be made unless r-f output measurements are unsatisfactory and no other cause can be determined.*

General. The test equipment required for adjustment and alignment of the T-25A is listed in Table 5–1. The bench test set-up using an ARC Type BTK-25A Bench Test Kit is shown in Figure 5–7 and the bench test set-up without a BTK-25A is shown in Figure 5–8. The standard test conditions described in paragraph 5–5 are applicable.

Note

The preliminary procedure outlined in Table 5–2 must be completed before any of the following alignment and adjustment procedures is begun.

Fractional Megacycle Oscillator.

Step 1. Set WHISTLE-THROUGH switch ON and adjust primary input voltage to 13.75 or 27.5 volts dc, as required.

Step 2. Connect r-f probe of Hewlett-Packard Model 410B Vacuum Tube Voltmeter to junction of C112 and L105 (other end of C112 connects to pin 4 of V102, see Figure 5–2). Set vtvm to read 10 volts ac full scale.

Step 3. Set fractional megacycle channel selector switch on control unit successively from .00 to .95 mc and observe voltages indicated on vtvm. Output voltage should be 3.5 volts or greater for each setting, indicating proper operation of fractional megacycle oscillator and individual crystals. Set WHISTLE-THROUGH switch OFF.

Megacycle Oscillator-Doubler.

Step 1. Set channel selector switches to 135.00 mc.

Step 2. Set Model 410B vtvm to read 3 volts ac full scale. Connect r-f probe to high side of doubler coil L102. Set WHISTLE-THROUGH switch ON. Adjust trimmer capacitor C106, located on rear bulkhead of transmitter (see Figure 5–10), for a maximum reading on vtvm.

Note

The oscillator-doubler plate capacitor, C107A-C107B, is factory adjusted and locked. Since its adjustment is not critical, it is not disturbed during normal alignment procedures.

Step 3. Set megacycle channel selector switch to 118.00 mc. Using tuning wand, check oscillator coil L103 for optimum peaking as indicated on the vtvm. If adjustment is required, adjust turn spacing of L103 with an insulated tool for maximum output.

Step 4. Repeat Steps 2 and 3 for optimum conditions.

Step 5. Set megacycle channel selector switch successively from 118 to 135 mc and note that doubler output voltage is present on all channels, as indicated on the vtvm. Presence of this voltage indicates that all megacycle crystals are functioning.

Note

The voltage observed on the vtvm for each channel is not the true doubler output voltage, due to the detuning effect of the vtvm r-f probe.

Step 6. Set megacycle channel selector switch to 135 mc. Set vtvm to read 10 volts ac full scale, and connect r-f probe to one side of L109. Using tuning wand, check tuning of doubler coil L102. The coil should not be peaked, but the turn spacing should be adjusted for an approximate 10% voltage decrease from maximum (at 135 mc) on the high inductance side.

Step 7. Set megacycle channel selector switch to 118 mc, and again adjust L102 for a 10% voltage decrease from maximum on the low inductance side.

Step 8. Repeat Steps 6 and 7 until the percentage decrease at 118 mc and 135 mc is approximately equal. Set WHISTLE-THROUGH switch OFF.

Mixer and R-f Amplifier.

Step 1. Set vtvm to read −100 volts dc full scale. Connect d-c probe to transmitter test point TP3 (see Figure 5–10). Set channel selector switches to 135.50 mc. Set WHISTLE-THROUGH switch ON.

Step 2. Using a No. 4 Bristol wrench, loosen setscrews in tuning arms of mixer plate capacitor C117, amplifier plate capacitor C127, and driver plate capacitor C137.

Step 3. Tune C117, C127, and C137 by means of screwdriver slots in ends of capacitor shafts (see Figure 5–10) for a maximum reading on vtvm. Note that each rotor section of split-stator capacitors C117, C127, and C137 is not at the minimum-capacitance position and that the capacitance will increase when the capacitors are rotated in a counterclockwise direction, as viewed from the shaft end.

Step 4. Use tuning wand on tank coils L109, L111, and L115 to determine if optimum peaking has been achieved. If optimum peaking is not obtained on any coil with minimum or greater capacitance, increase coil-turn spacing with an insulated tool until optimum peaking is obtained. Tighten setscrews in tuning arms of C117, C127, and C137, taking care not to disturb the settings. The vtvm reading should be approximately −40 volts.

Step 5. Set channel selector switches to 118.50 mc. Tune C117, C127, and C137 by means of their respective tuning arm adjustment screws (see Figure 5–10) for a maximum reading on the vtvm.

Step 6. Set channel selector switches to 135.50 mc. Set WHISTLE-THROUGH switch OFF and TRANS KEY switch ON. Loosen setscrews in tuning arms of C137 and C140, and tune the capacitors by means of their slotted shafts for a maximum reading on the r-f wattmeter. Tighten setscrews.

Step 7. Set channel selector switches to 118.50 mc. Tune C137 and C140 by means of their tuning arm adjustment screws for a maximum reading on the r-f wattmeter.

Step 8. Using an insulated tool, adjust output coupling loop L120 for slightly less than maximum output on the undercoupled side of maximum coupling. Repeat Steps 6 and 7 to obtain maximum r-f output.

Step 9. Check power output at 135.00 and 135.95 mc. The power output at these two frequencies should be the same within 1 watt. If a difference greater than 1 watt is noted, check tank coils L109, L111, and L115 with tuning wand to determine the adjustment required to increase the lower of the two power outputs. Retune C127, C137, and C140 by means of their slotted shafts until power output is equalized within 1 watt.

Step 10. Check power output at 118.00 and 118.95 mc. The power output at these two frequencies should be the same within 1 watt. If a difference greater than 1 watt is noted, check tank coils L109, L111, and L115 with tuning wand to determine the adjustment required to increase the lower of the two power outputs. Retune C127, C137, and C140 by means of their tuning arm adjustment screws until power output is equalized within 1 watt.

Step 11. Check for power output on all fractional megacycle channels and then on all megacycle channels. The power output on all channels should be 6 watts minimum. Set TRANS KEY to OFF.

Modulator.

GENERAL. The modulator adjustment may be made with an ARC Type BTK-25A Bench Test Kit, or with an oscilloscope or voltmeter if a BTK-25A is not available. The three methods are described in the following paragraphs.

BTK-25A METHOD.

Step 1. Connect Hewlett-Packard Model 200AB Audio Oscillator to AUDIO INPUT terminals of H-25A Transmitter Test Unit as shown in Figure 5–7.

Note

If desired, the modulator adjustment given in Steps 4, 5, and 6 of this procedure may be monitored using a Tektronix Type 310 Oscilloscope, or equivalent. Connect the d-c vertical input of the oscilloscope to the MOD TEST jacks of the H-25A (see Figure 5–7). The desired modulation pattern is shown in the figure of the next paragraph.

Step 2. Turn audio oscillator on and adjust frequency to 1000 cps. Set channel selector switches to 126.50 mc. Loosen locknut on MIC control located at the front of the modulator chassis.

Step 3. Set H-25A a-c meter switch to AUDIO IN 0-1V. Press TRANS KEY switch to MOMENTARY, and adjust audio oscillator for an output of 0.5 volt as read on the a-c meter. Release TRANS KEY switch.

Step 4. Set a-c meter switch to MOD CAL. Press TRANS KEY switch to MOMENTARY, and adjust H-25A MOD CAL control to red-line (MOD CAL) indication on a-c meter. Repeat Step 3 to check audio input setting. Reset a-c meter switch to MOD CAL and readjust MOD CAL control to red-line indication, if required. Release TRANS KEY switch.

Step 5. Set a-c meter switch to MOD LEVEL. Press TRANS KEY switch to MOMENTARY. Observe modulation level on a-c meter. Adjust the modulator MIC control so that the reading is within the green (MOD LEVEL) sector of the a-c meter scale, corresponding to a satisfactory adjustment of modulation level. Release TRANS KEY switch.

Step 6. Repeat Steps 4 and 5 to check accuracy of all adjustments.

Note

Steps 4, 5, and 6 should be completed as quickly as possible to avoid shifts in calibration settings.

Step 7. To check sidetone voltage, set a-c switch to SIDETONE 0-10V. Set SIDETONE control on T-25A front panel full clockwise. Press TRANS KEY switch to MOMENTARY. Read sidetone voltage on a-c meter; meter reading should be greater than 5.5 volts. Release TRANS KEY switch.

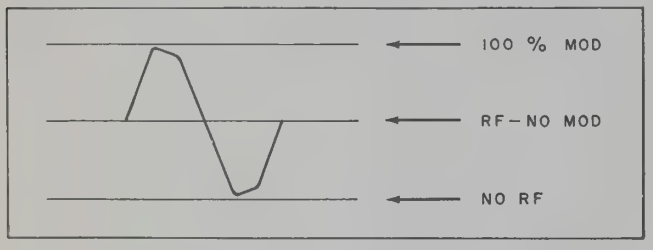
OSCILLOSCOPE METHOD. The following method for adjusting the modulator without a BTK-25A requires the use of a Tektronix Type 310 Oscilloscope, or equivalent, and the linear detector shown in Figure 5–9 to observe the demodulated output signal of the T-25A. An alternative method, using a Ballantine Model 300 Voltmeter, is described in the next paragraph.

Step 1. Connect linear detector between ANT connector of T-25A and r-f wattmeter as shown in Figure 5–8. Connect linear detector to d-c vertical input of oscilloscope. Connect Hewlett-Packard Model 200AB Audio Oscillator to AUDIO INPUT terminals of the test panel.

Step 2. Turn audio oscillator on. Set AUDIO INPUT-MIC switch to AUDIO INPUT. Set MOD-SIDETONE switch to MOD. Set channel selector switches to 126.50 mc. Adjust audio oscillator frequency to 1000 cps. Loosen locknut on MIC control located at front of modulator chassis.

Step 3. Set TRANS KEY switch ON. Set Ballantine Model 300 Voltmeter to read 1.0 volt full scale. Adjust audio oscillator to an output of 0.5 volt as indicated on the Model 300.

Step 4. Adjust MIC control so that carrier is modulated approximately 90–95% with a reasonable amount of clipping present, as indicated by the following oscilloscope pattern:



Lock MIC control, being careful not to disturb the setting. Set TRANS KEY switch OFF.

Step 5. To check sidetone, set Ballantine Model 300 Voltmeter to read 10 volts full scale. Set SIDETONE control on T-25A front panel full clockwise. Set MOD-SIDETONE switch to SIDETONE. Set TRANS KEY switch ON. Read sidetone voltage on the Model 300. The voltmeter reading should be greater than 5.5 volts. Set TRANS KEY switch OFF.

Voltmeter Method. The following method for adjusting the modulator requires a Ballantine Model 300 Voltmeter. An alternative method is described in the previous paragraph.

Step 1. Connect the Hewlett-Packard Model 200AB Audio Oscillator to AUDIO INPUT terminals of the test panel (see Figure 5–8).

Step 2. Turn audio oscillator on. Set AUDIO INPUT-MIC switch to AUDIO INPUT. Set MOD-SIDETONE switch to MOD. Set channel selector switches to 126.50 mc. Adjust audio oscillator frequency to 1000 cps. Loosen locknut on MIC control, located at front of modulator chassis.

Step 3. Set TRANS KEY switch ON. Set Ballantine Model 300 Voltmeter to read 1.0 volt full scale. Adjust audio oscillator for an output of 0.5 volt as indicated on the Model 300. Set TRANS KEY switch OFF.

Step 4. Set SIDETONE control on T-25A front panel full clockwise. Set MOD-SIDETONE switch to SIDETONE. Set Model 300 to read 10 volts full scale. Set TRANS KEY switch ON.

Step 5. Increase setting of MIC control clockwise until sidetone output reading on Model 300 just reaches a peak value (this reading should be greater than 6.0 volts). Rotate MIC control slightly counterclockwise so that the sidetone reading drops approximately 0.5 volt (this setting is equivalent to approximately 90% modulation of the r-f carrier). Lock MIC control, being careful not to disturb the setting. Set TRANS KEY switch OFF.

Whistle-through.

Step 1. Set Hewlett-Packard Model 410B vtvm to read 30 volts ac full scale, and connect a-c probe to test point TP1 of the T-25A (see Figure 5–10). Set channel selector switches to 126.50 mc.

Step 2. Set WHISTLE-THROUGH switch ON. The Model 410B should indicate at least 17 volts ac.

Note

The operation of the whistle-through circuit can also be checked by measuring the d-c voltage on TP1, using a vtvm, a Simpson Model 260 Multimeter, or the d-c voltmeter in the H-25A. The meter should read at least −20 volts dc during whistle-through.

Tuner Assembly.

Normally, no adjustment of either tuner assembly in the T-25A should be necessary; however, if it is definitely determined that readjustment is required, proceed as follows (see Figure 5–11):

Note

The adjustments must be made with the gearing assembly in place.

Step 1. To adjust the latching relay position: Rotate the drive cam to maximum-throw position. Adjust the relay mounting screws and locking setscrews in the mounting posts so that, with the relay unenergized, the latch overlaps the latching pin by at least .020 inch and clears the pin by at least .015 inch and, with the relay energized, the latch disengages the latching pin with at least .015-inch clearance on the back stroke.

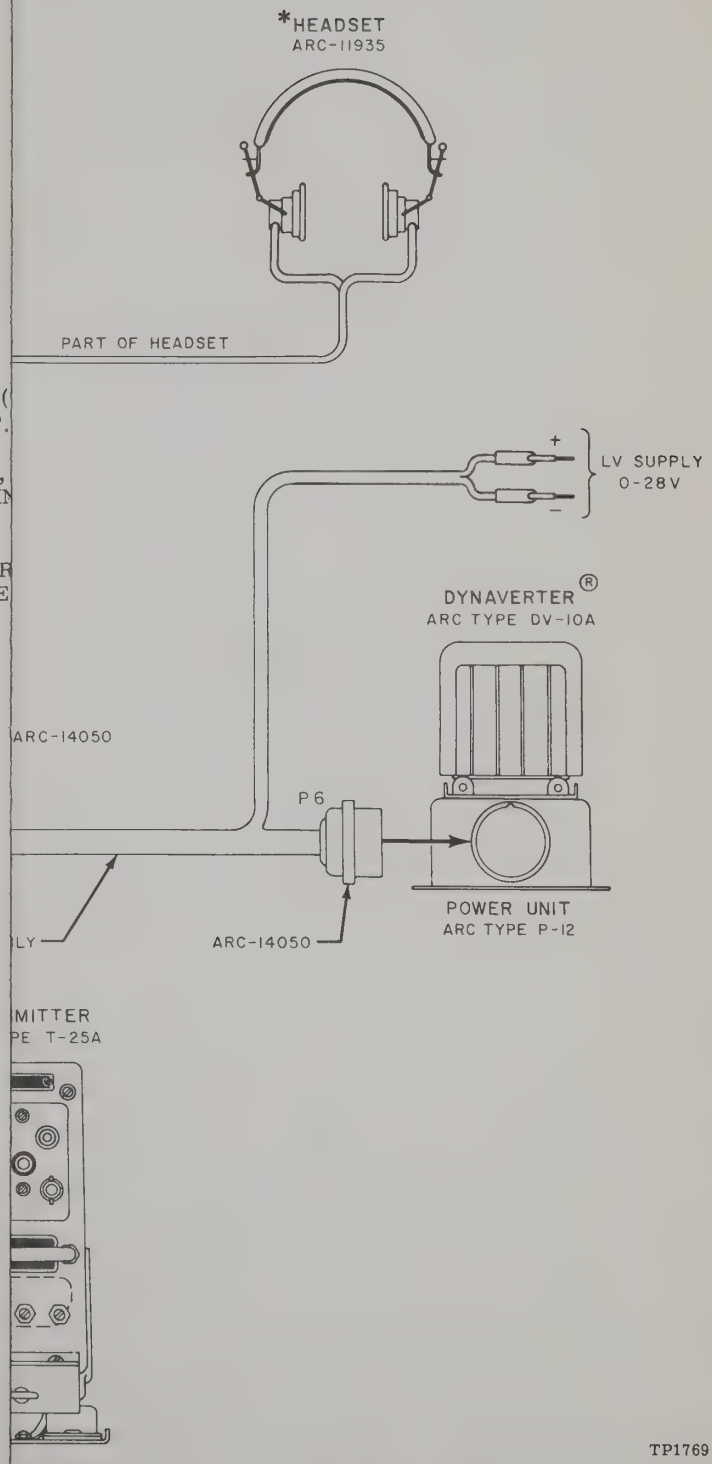
Step 2. To adjust the driving stroke: Loosen the drive-pawl pivot screw. With the relay energized, manually adjust the pawl position in the slotted end of the driving arm so that, near maximum cam throw, the indexing pin drops into the slot in the index plate in all positions; and in minimum cam throw, the drive pawl retracts sufficiently to engage the following ratchet tooth of the drive ratchet plate in all positions.

5–8. VOLTAGE AND RESISTANCE MEASUREMENTS.

Typical voltage and resistance measurements for the T-25A Transmitter are given in Figure 5–12. Input and level measurements for the T-25A are given in Tables 5–5 and 5–6, respectively. All measurements were made under the conditions noted.

NOTES:

1. PARTS MARKED WITH AN ASTERISK (
   NOT PART OF THE BENCH TEST KIT.
2. IF NO EXTERNAL CONTROL IS USED,
   "EXT-INT" CONTROL SWITCH TO "IN
   POSITION.
3. TRANSMITTER AND CONTROL UNIT R
   CEPTACLES ARE AT THE REAR OF E
   UNIT.



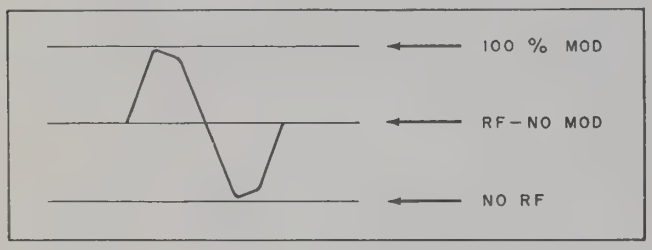
TP1769

Figure 5–7. Bench Test Interconnection Diagram With BTK-25A

Step 2. Turn audio oscillator on. Set AUDIO INPUT-MIC switch to AUDIO INPUT. Set MOD-SIDETONE switch to MOD. Set channel selector switches to 126.50 mc. Adjust audio oscillator frequency to 1000 cps. Loosen locknut on MIC control located at front of modulator chassis.

Step 3. Set TRANS KEY switch ON. Set Ballantine Model 300 Voltmeter to read 1.0 volt full scale. Adjust audio oscillator to an output of 0.5 volt as indicated on the Model 300.

Step 4. Adjust MIC control so that carrier is modulated approximately 90–95% with a reasonable amount of clipping present, as indicated by the following oscilloscope pattern:



Lock MIC control, being careful not to disturb the setting. Set TRANS KEY switch OFF.

Step 5. To check sidetone, set Ballantine Model 300 Voltmeter to read 10 volts full scale. Set SIDETONE control on T-25A front panel full clockwise. Set MOD-SIDETONE switch to SIDETONE. Set TRANS KEY switch ON. Read sidetone voltage on the Model 300. The voltmeter reading should be greater than 5.5 volts. Set TRANS KEY switch OFF.

Voltmeter Method. The following method for adjusting the modulator requires a Ballantine Model 300 Voltmeter. An alternative method is described in the previous paragraph.

Step 1. Connect the Hewlett-Packard Model 200AB Audio Oscillator to AUDIO INPUT terminals of the test panel (see Figure 5–8).

Step 2. Turn audio oscillator on. Set AUDIO INPUT-MIC switch to AUDIO INPUT. Set MOD-SIDETONE switch to MOD. Set channel selector switches to 126.50 mc. Adjust audio oscillator frequency to 1000 cps. Loosen locknut on MIC control, located at front of modulator chassis.

Step 3. Set TRANS KEY switch ON. Set Ballantine Model 300 Voltmeter to read 1.0 volt full scale. Adjust audio oscillator for an output of 0.5 volt as indicated on the Model 300. Set TRANS KEY switch OFF.

Step 4. Set SIDETONE control on T-25A front panel full clockwise. Set MOD-SIDETONE switch to SIDETONE. Set Model 300 to read 10 volts full scale. Set TRANS KEY switch ON.

Step 5. Increase setting of MIC control clockwise until sidetone output reading on Model 300 just reaches a peak value (this reading should be greater than 6.0 volts). Rotate MIC control slightly counterclockwise so that the sidetone reading drops approximately 0.5 volt (this setting is equivalent to approximately 90% modulation of the r-f carrier). Lock MIC control, being careful not to disturb the setting. Set TRANS KEY switch OFF.

Whistle-through.

Step 1. Set Hewlett-Packard Model 410B vtvm to read 30 volts ac full scale, and connect a-c probe to test point TP1 of the T-25A (see Figure 5–10). Set channel selector switches to 126.50 mc.

Step 2. Set WHISTLE-THROUGH switch ON. The Model 410B should indicate at least 17 volts ac.

Note

The operation of the whistle-through circuit can also be checked by measuring the d-c voltage on TP1, using a vtvm, a Simpson Model 260 Multimeter, or the d-c voltmeter in the H-25A. The meter should read at least −20 volts dc during whistle-through.

Tuner Assembly.

Normally, no adjustment of either tuner assembly in the T-25A should be necessary; however, if it is definitely determined that readjustment is required, proceed as follows (see Figure 5–11):

Note

The adjustments must be made with the gearing assembly in place.

Step 1. To adjust the latching relay position: Rotate the drive cam to maximum-throw position. Adjust the relay mounting screws and locking setscrews in the mounting posts so that, with the relay unenergized, the latch overlaps the latching pin by at least .020 inch and clears the pin by at least .015 inch and, with the relay energized, the latch disengages the latching pin with at least .015-inch clearance on the back stroke.

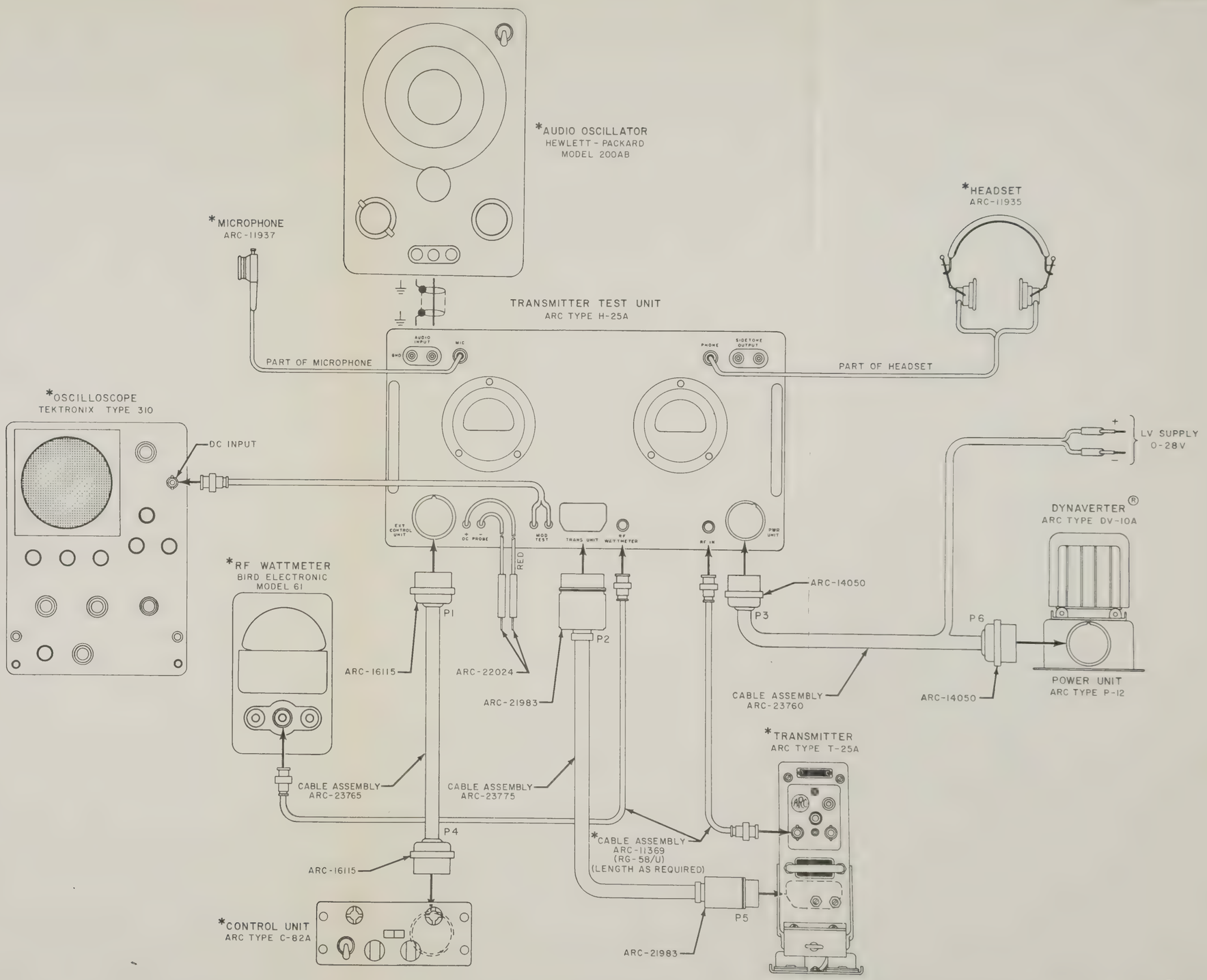
Step 2. To adjust the driving stroke: Loosen the drive-pawl pivot screw. With the relay energized, manually adjust the pawl position in the slotted end of the driving arm so that, near maximum cam throw, the indexing pin drops into the slot in the index plate in all positions; and in minimum cam throw, the drive pawl retracts sufficiently to engage the following ratchet tooth of the drive ratchet plate in all positions.

5–8. VOLTAGE AND RESISTANCE MEASUREMENTS.

Typical voltage and resistance measurements for the T-25A Transmitter are given in Figure 5–12. Input and level measurements for the T-25A are given in Tables 5–5 and 5–6, respectively. All measurements were made under the conditions noted.

NOTES:

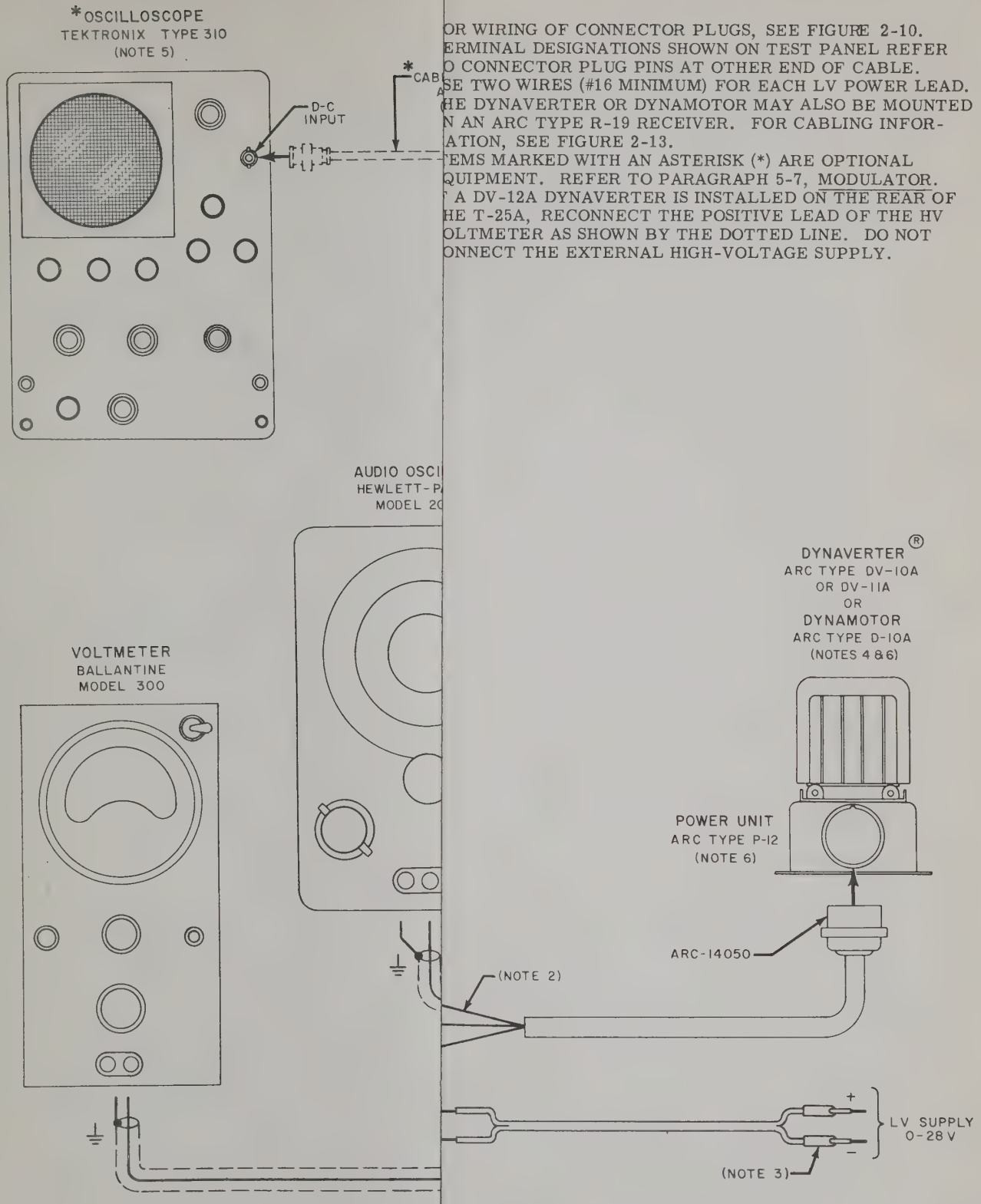
1. PARTS MARKED WITH AN ASTERISK (*) ARE NOT PART OF THE BENCH TEST KIT.
2. IF NO EXTERNAL CONTROL IS USED, SET "EXT-INT" CONTROL SWITCH TO "INT" POSITION.
3. TRANSMITTER AND CONTROL UNIT RECEPTACLES ARE AT THE REAR OF EACH UNIT.



TP1769

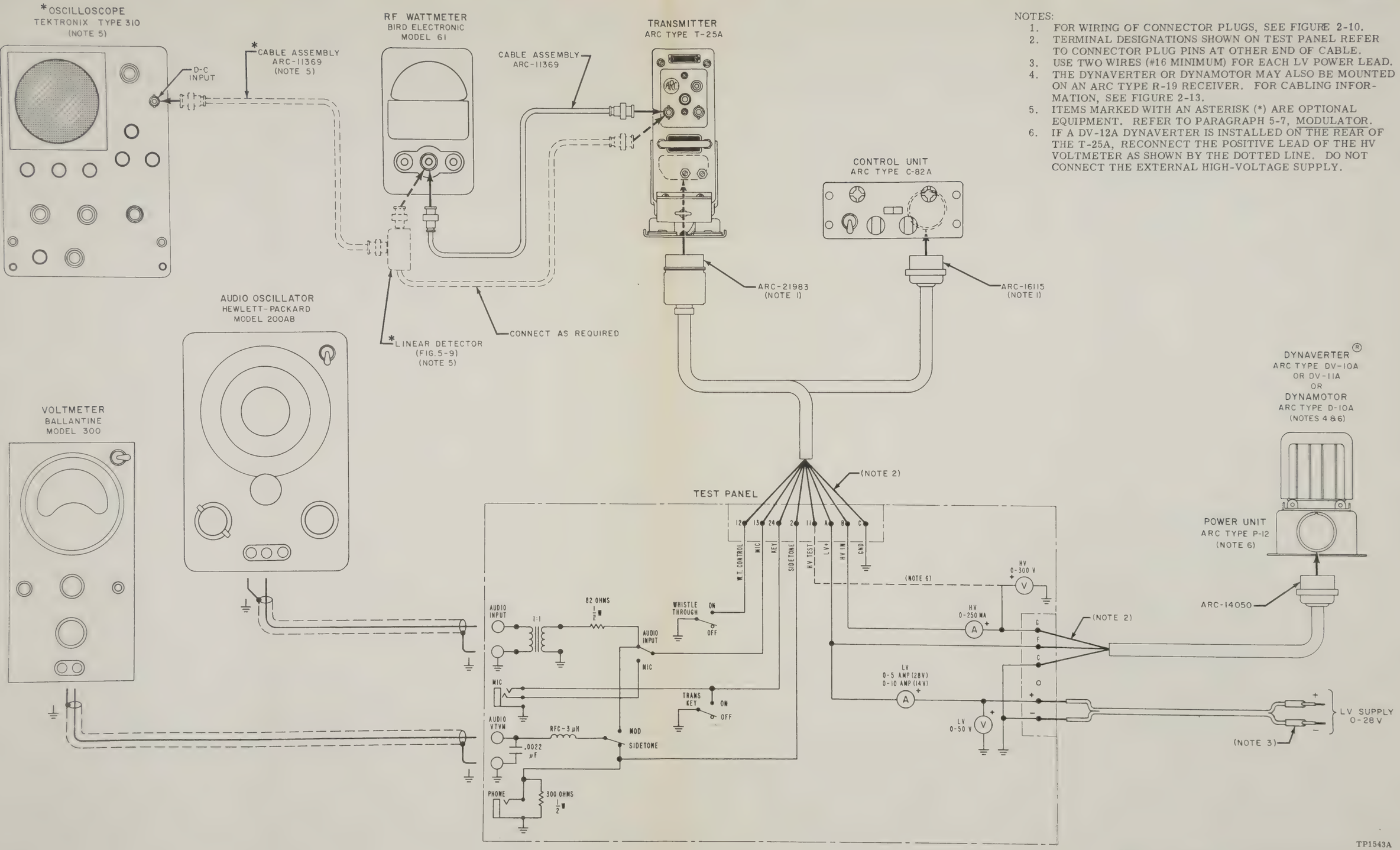
Figure 5–7. Bench Test Interconnection Diagram With BTK-25A

OR WIRING OF CONNECTOR PLUGS, SEE FIGURE 2-10.
ERMINAL DESIGNATIONS SHOWN ON TEST PANEL REFER
O CONNECTOR PLUG PINS AT OTHER END OF CABLE.
SE TWO WIRES (#16 MINIMUM) FOR EACH LV POWER LEAD.
HE DYNAVERTER OR DYNAMOTOR MAY ALSO BE MOUNTED
N AN ARC TYPE R-19 RECEIVER. FOR CABLING INFOR-
ATION, SEE FIGURE 2-13.
TEMS MARKED WITH AN ASTERISK (*) ARE OPTIONAL
QUIPMENT. REFER TO PARAGRAPH 5-7, MODULATOR.
A DV-12A DYNAVERTER IS INSTALLED ON THE REAR OF
HE T-25A, RECONNECT THE POSITIVE LEAD OF THE HV
OLTMETER AS SHOWN BY THE DOTTED LINE. DO NOT
ONNECT THE EXTERNAL HIGH-VOLTAGE SUPPLY.



TP1543A

Figure 5–8. Bench Test Interconnection Diagram Without BTK-25A

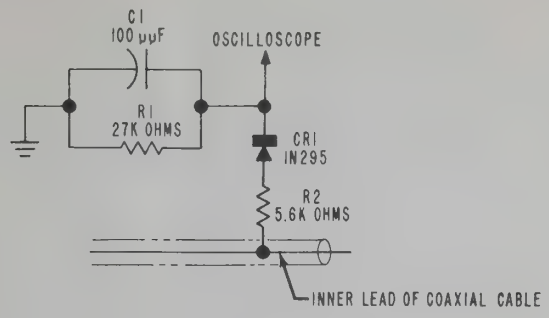


NOTES:

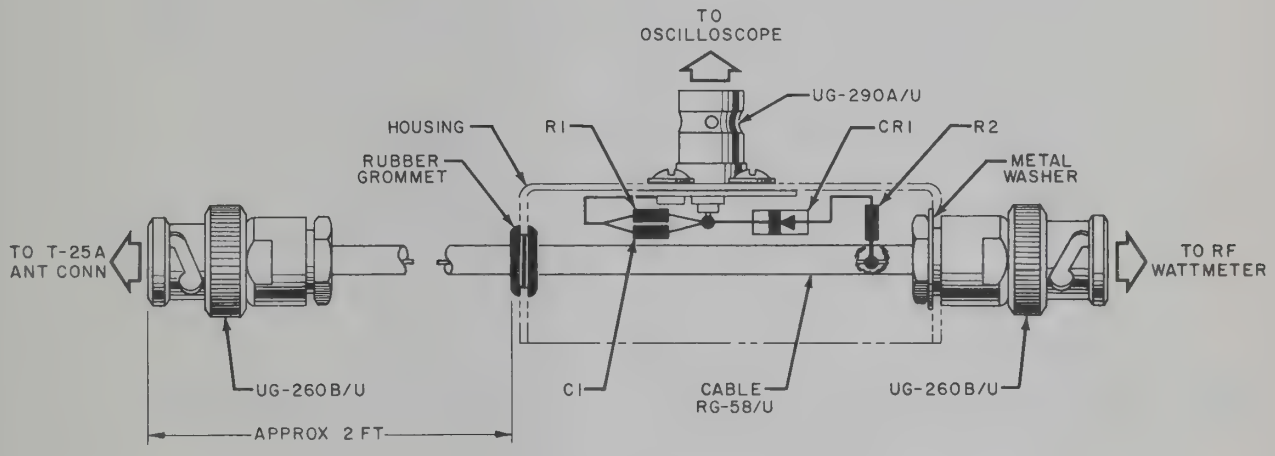
1. FOR WIRING OF CONNECTOR PLUGS, SEE FIGURE 2-10.
2. TERMINAL DESIGNATIONS SHOWN ON TEST PANEL REFER TO CONNECTOR PLUG PINS AT OTHER END OF CABLE.
3. USE TWO WIRES (#16 MINIMUM) FOR EACH LV POWER LEAD.
4. THE DYNAVERTER OR DYNAMOTOR MAY ALSO BE MOUNTED ON AN ARC TYPE R-19 RECEIVER. FOR CABLING INFORMATION, SEE FIGURE 2-13.
5. ITEMS MARKED WITH AN ASTERISK (*) ARE OPTIONAL EQUIPMENT. REFER TO PARAGRAPH 5-7, MODULATOR.
6. IF A DV-12A DYNAVERTER IS INSTALLED ON THE REAR OF THE T-25A, RECONNECT THE POSITIVE LEAD OF THE HV VOLTMETER AS SHOWN BY THE DOTTED LINE. DO NOT CONNECT THE EXTERNAL HIGH-VOLTAGE SUPPLY.

TP1543A

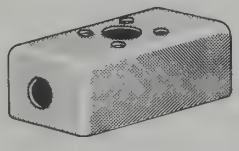
Figure 5–8. Bench Test Interconnection Diagram Without BTK-25A

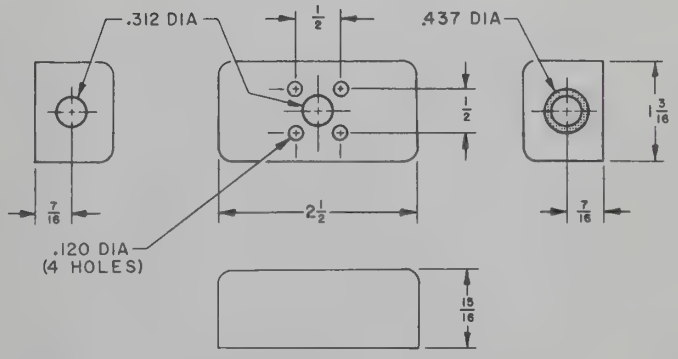


SCHEMATIC DIAGRAM



WIRING DIAGRAM





TYPICAL HOUSING
(.031 ALUMINUM)

NOTE: DIMENSIONS ARE IN INCHES.

TP1545

Figure 5–9. Linear Detector for T-25A Transmitter Bench Test Set-up

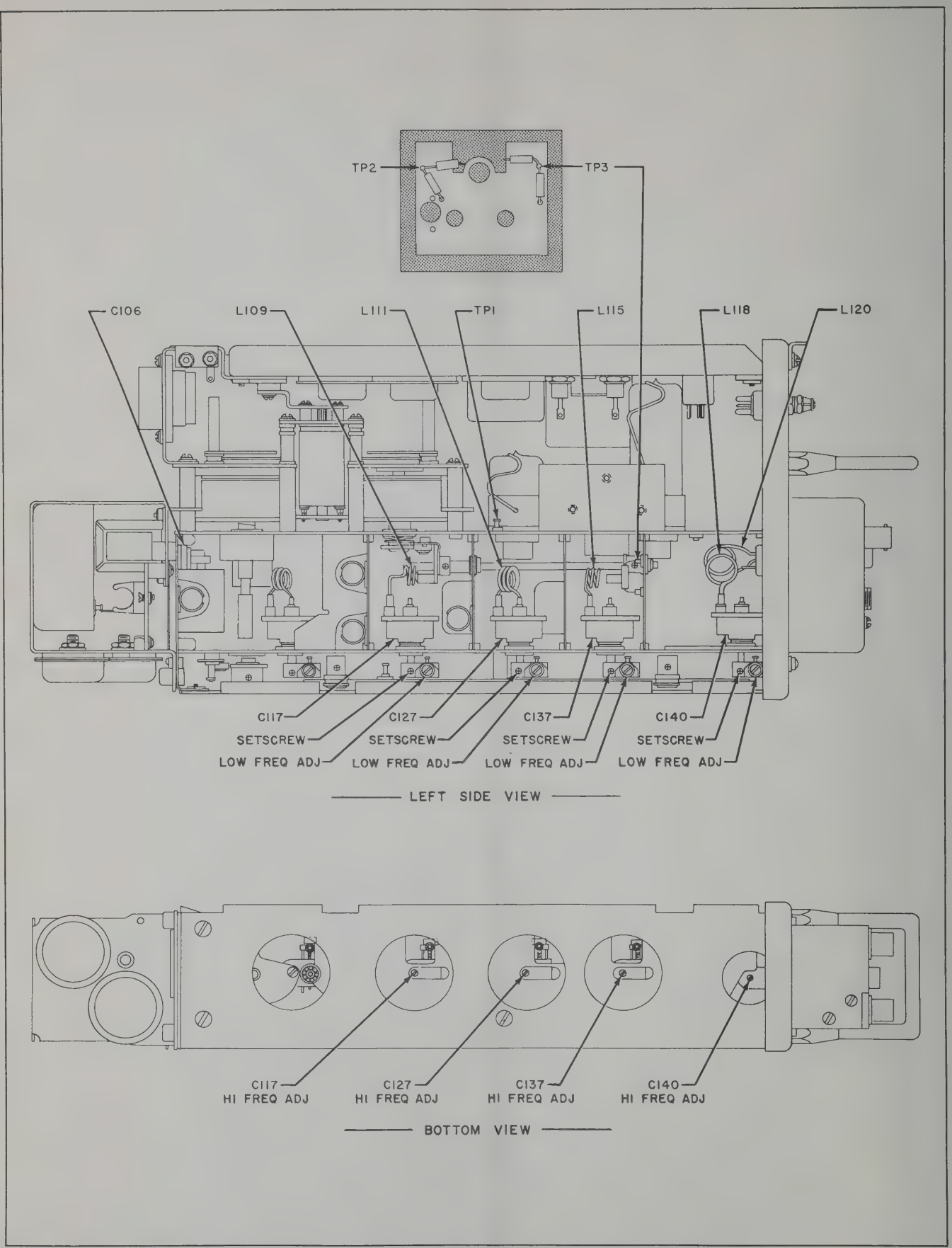


Figure 5–10. T-25A Transmitter, Location of Tuning Adjustments

TP1547

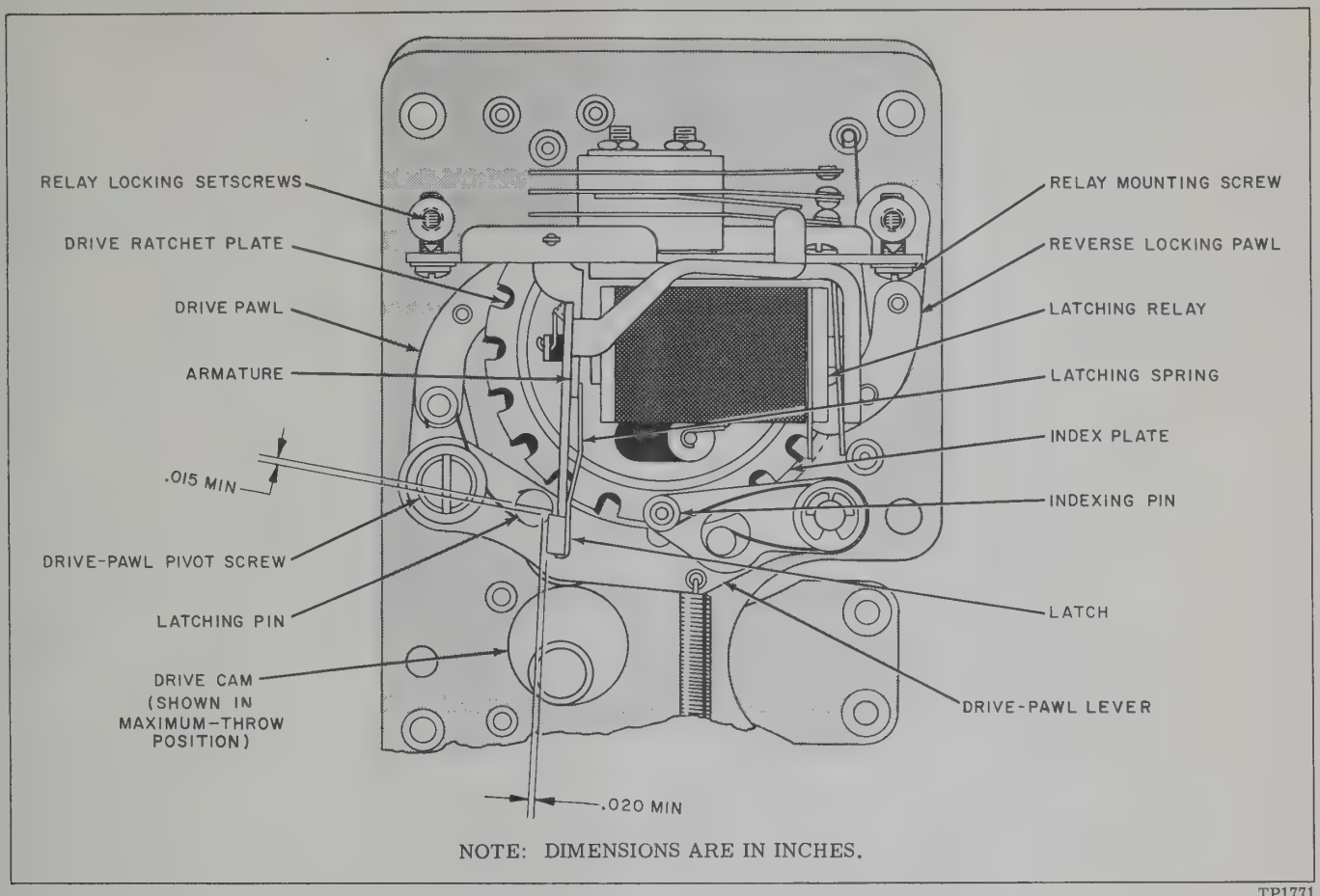


Figure 5–11. T-25A Transmitter, Tuner Assembly Adjustment Points

TABLE 5–5. T-25A INPUT MEASUREMENTS

Conditions:

1. Equipment connected as shown in Figure 5–7 or Figure 5–8. Test conditions described in paragraph 5–5 and the preliminary procedure given in Table 5–2 also apply.
2. Channel selector switches set to 135.00 mc.
3. Measurements made with no r-f carrier modulation.
4. If a BTK-25A is used, all input measurements made with the H-25A d-c meter, as noted.
5. If a BTK-25A is not used, all input measurements made using Weston Model 301 Voltmeters and Ammeters installed in the test panel shown in Figure 5–8.

MEASUREMENTS WITH BTK-25A (See Figure 5–7)			MEASUREMENTS WITHOUT BTK-25A (See Figure 5–8)		
H-25A D-c Meter Switch Position	*Stand-by Condition* [1]	*Transmit Condition* [1]	*Test Panel D-c Meter* [1]	*Stand-by Condition* [1]	*Transmit Condition* [1]
0-8A [2]	0.9 (1.6) amp	2.5 (5.6) amp	0-5A (0-10A) [2]	0.9 (1.6) amp	2.5 (5.6) amp
0-400MA	—	141 ma	0-250MA	—	141 ma
0-40V	27.5 (13.75) volts	27.5 (13.75) volts	0-50V	27.5 (13.75) volts	27.5 (13.75) volts
0-400V [3]	270 volts	260 volts	0-300V [3]	270 volts	260 volts

[1] Currents and voltages shown in parentheses are for 14-volt model.
[2] LV currents shown are for a T-25A plus Dynaverter. If a dynamotor is used in place of a Dynaverter, stand-by and transmit currents will be 1.5 (2.5) and 3.2 (6.2) amperes, respectively.
[3] HV values shown are for a Dynaverter. If a dynamotor is used, stand-by and transmit voltages will be 300 and 250 volts, respectively.

TABLE 5–6. T-25A LEVEL MEASUREMENTS

Conditions:

1. Equipment connected as shown in Figure 5–7 or 5–8. The test conditions of paragraph 5–5 and the preliminary procedure of Table 5–2 also apply.
2. Channel selector switches set to 135.00 mc.
3. Unless otherwise noted, all voltage measurements made with a vacuum tube voltmeter such as Hewlett-Packard Model 410B, or equivalent.
4. Transmitter voltage measurements made with no r-f carrier modulation.
5. For whistle-through measurement, set TRANS KEY switch OFF and WHISTLE-THROUGH switch ON.
6. Modulator voltages measured with a Hewlett-Packard Model 200AB Audio Oscillator connected to AUDIO INPUT terminals of test set-up. If a BTK-25A is not used, set AUDIO INPUT-MIC switch to AUDIO INPUT, MOD-SIDE-TONE switch to MOD, and connect Ballantine Model 300 Voltmeter as shown in Figure 5–8. Adjust audio oscillator to 1000 cps for a 0.5-volt reading on H-25A a-c meter or on Model 300. Set modulator MIC control to approximate mid-point position.

OSCILLATOR R-F VOLTAGES

Oscillator	*Frequency (mc)*	*Test Point*	*R-f Voltage (volts)*
Megacycle	118 to 135 [1]	Junction C103 and L102	0.5 to 2.0
Fractional Megacycle	.00 to .95	Junction C112 and L105	3.5 to 7.5

TRANSMITTER TEST POINT VOLTAGES
(Refer to Condition No. 4)

Test Point	*Frequency [2] (mc)*	*D-c Voltage (volts)*
TP1 (driver amplifier grid)	118.00 to 135.95	—3.5 to —18.0
TP2 (power amplifier grid)	118.00 to 135.95	—30 to —70
TP3 (power amplifier grid)	118.00 to 135.95	—30 to —70

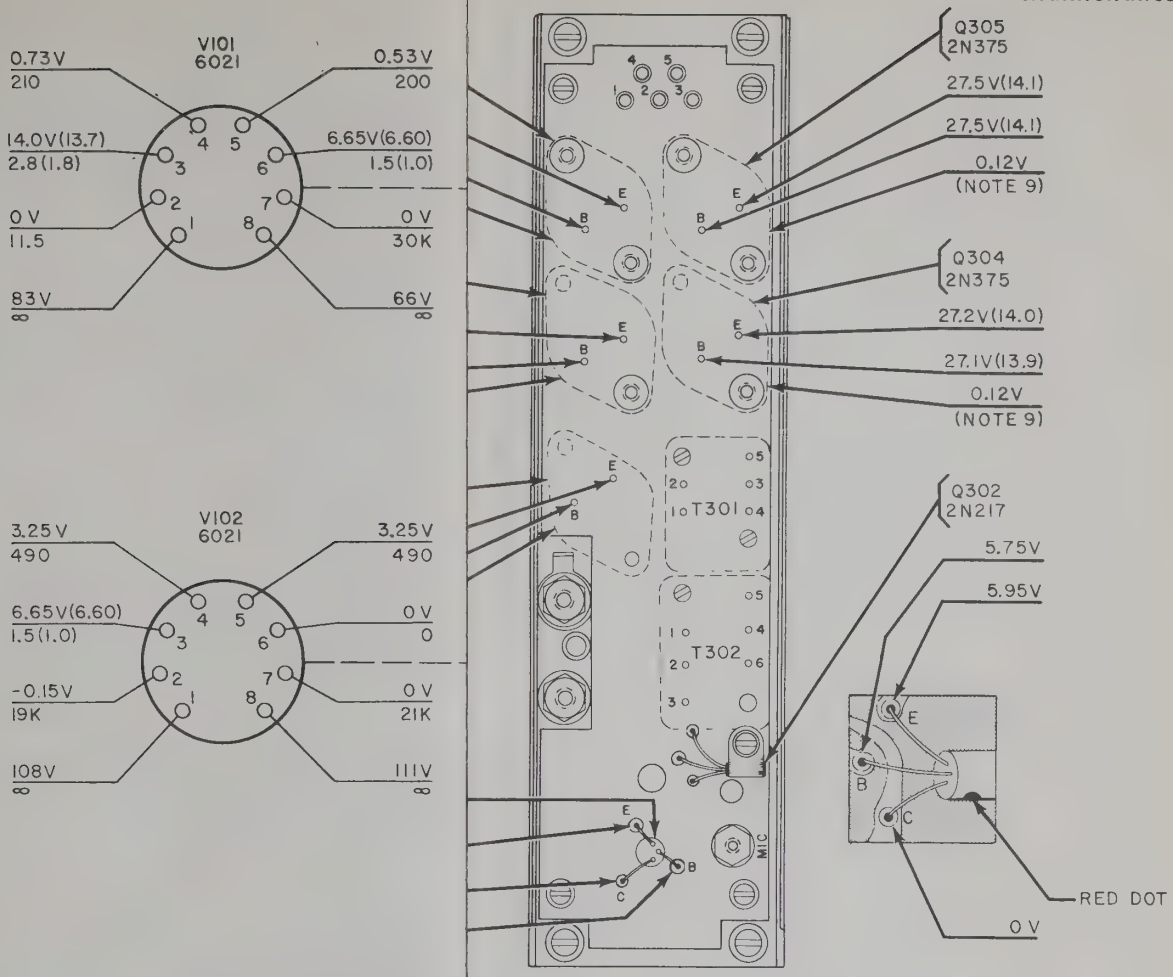
WHISTLE-THROUGH VOLTAGE
(Refer to Condition No. 5)

Test Point	*Frequency (mc)*	*A-c Voltage (volts)*	*D-c Voltage [3] (volts)*
TP1 (driver amplifier grid)	126.50	17 to 29	—20 to —35

MODULATOR AUDIO LEVEL MEASUREMENTS
(Refer to Condition No. 6)

Test Point	*A-c Voltage (volts)*
Q301 base	0.33
Q302 base	2.43
Q303 base to Q304 base	9.9
Q305 base to Q306 base	31.0

[1] Select megacycle channels only.
[2] Select all megacycle channels and then all fractional megacycle channels.
[3] A Simpson Model 260 Multimeter (20,000 ohms-per-volt), or equivalent, can also be used for this measurement.



ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING

SCONNECTED FROM T-25A TRANSMITTER.
IENTS MADE FROM PIN INDICATED TO
ROUND, UNLESS OTHERWISE NOTED.
PROBE OF OHMMETER GROUNDED TO

ESISTANCES SHOWN IN PARENTHESES ARE FOR
ODEL.

TED NC = NO CONNECTION.

SUREMENT CAN BE MADE.

GH SWITCH TO ON FOR THIS MEASUREMENT ONLY.

MEASUREMENT, SEE TEST POINT VOLTAGE IN TABLE 5-6.

ORS) OF Q303, Q304, Q305, AND Q306 ARE INSULATED FROM
CONNECTED TOGETHER BY A MOUNTING PLATE.

TP1775

Figure 5–12. T-25A Transmitter, Voltage and Resistance Measurements

TABLE 5–6. T-25A LEVEL MEASUREMENTS

Conditions:

1. Equipment connected as shown in Figure 5–7 or 5–8. The test conditions of paragraph 5–5 and the preliminary procedure of Table 5–2 also apply.
2. Channel selector switches set to 135.00 mc.
3. Unless otherwise noted, all voltage measurements made with a vacuum tube voltmeter such as Hewlett-Packard Model 410B, or equivalent.
4. Transmitter voltage measurements made with no r-f carrier modulation.
5. For whistle-through measurement, set TRANS KEY switch OFF and WHISTLE-THROUGH switch ON.
6. Modulator voltages measured with a Hewlett-Packard Model 200AB Audio Oscillator connected to AUDIO INPUT terminals of test set-up. If a BTK-25A is not used, set AUDIO INPUT-MIC switch to AUDIO INPUT, MOD-SIDE-TONE switch to MOD, and connect Ballantine Model 300 Voltmeter as shown in Figure 5–8. Adjust audio oscillator to 1000 cps for a 0.5-volt reading on H-25A a-c meter or on Model 300. Set modulator MIC control to approximate mid-point position.

OSCILLATOR R-F VOLTAGES

Oscillator	*Frequency (mc)*	*Test Point*	*R-f Voltage (volts)*
Megacycle	118 to 135 [1]	Junction C103 and L102	0.5 to 2.0
Fractional Megacycle	.00 to .95	Junction C112 and L105	3.5 to 7.5

TRANSMITTER TEST POINT VOLTAGES
(Refer to Condition No. 4)

Test Point	*Frequency [2] (mc)*	*D-c Voltage (volts)*
TP1 (driver amplifier grid)	118.00 to 135.95	—3.5 to —18.0
TP2 (power amplifier grid)	118.00 to 135.95	—30 to —70
TP3 (power amplifier grid)	118.00 to 135.95	—30 to —70

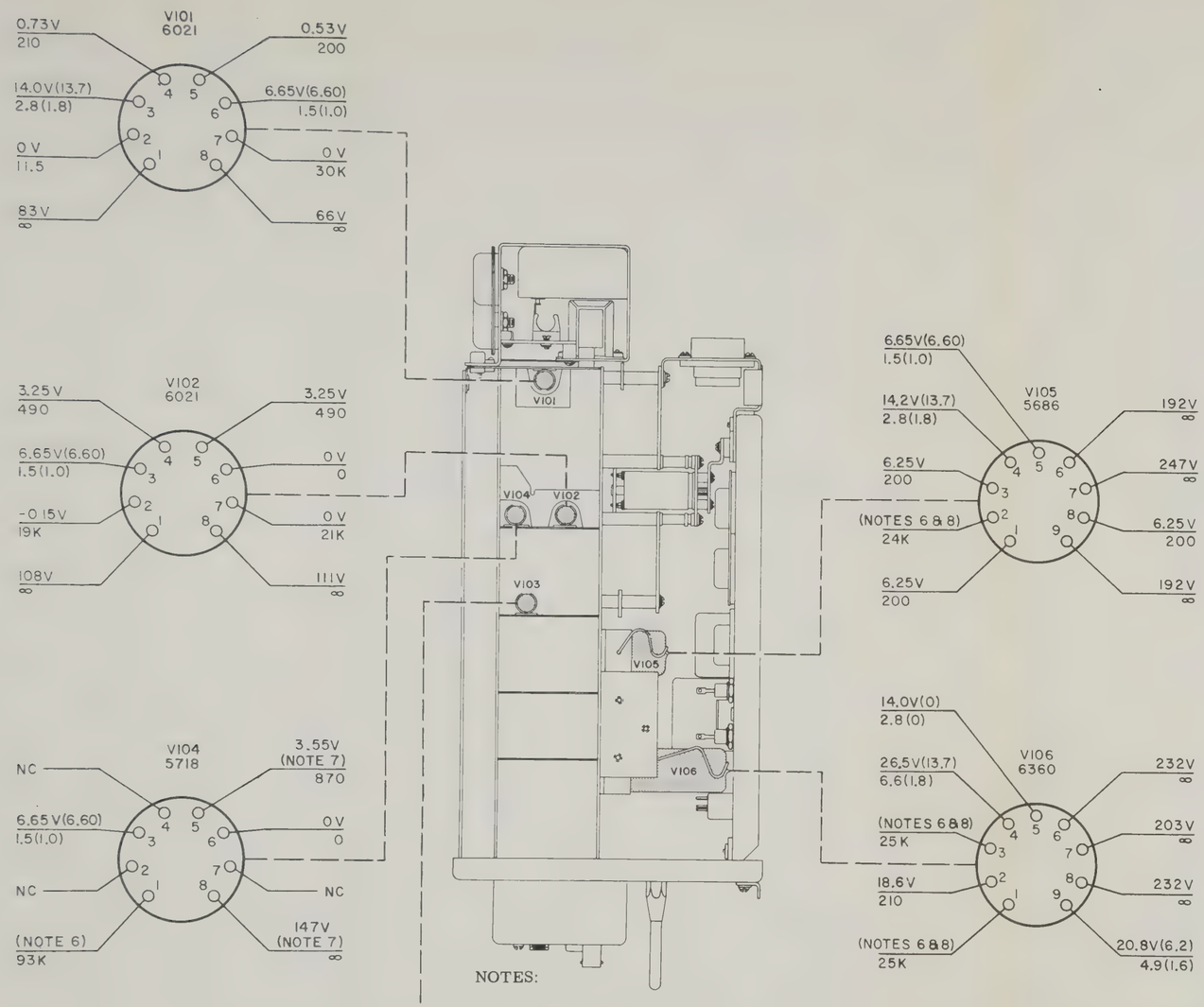
WHISTLE-THROUGH VOLTAGE
(Refer to Condition No. 5)

Test Point	*Frequency (mc)*	*A-c Voltage (volts)*	*D-c Voltage [3] (volts)*
TP1 (driver amplifier grid)	126.50	17 to 29	—20 to —35

MODULATOR AUDIO LEVEL MEASUREMENTS
(Refer to Condition No. 6)

Test Point	*A-c Voltage (volts)*
Q301 base	0.33
Q302 base	2.43
Q303 base to Q304 base	9.9
Q305 base to Q306 base	31.0

[1] Select megacycle channels only.
[2] Select all megacycle channels and then all fractional megacycle channels.
[3] A Simpson Model 260 Multimeter (20,000 ohms-per-volt), or equivalent, can also be used for this measurement.

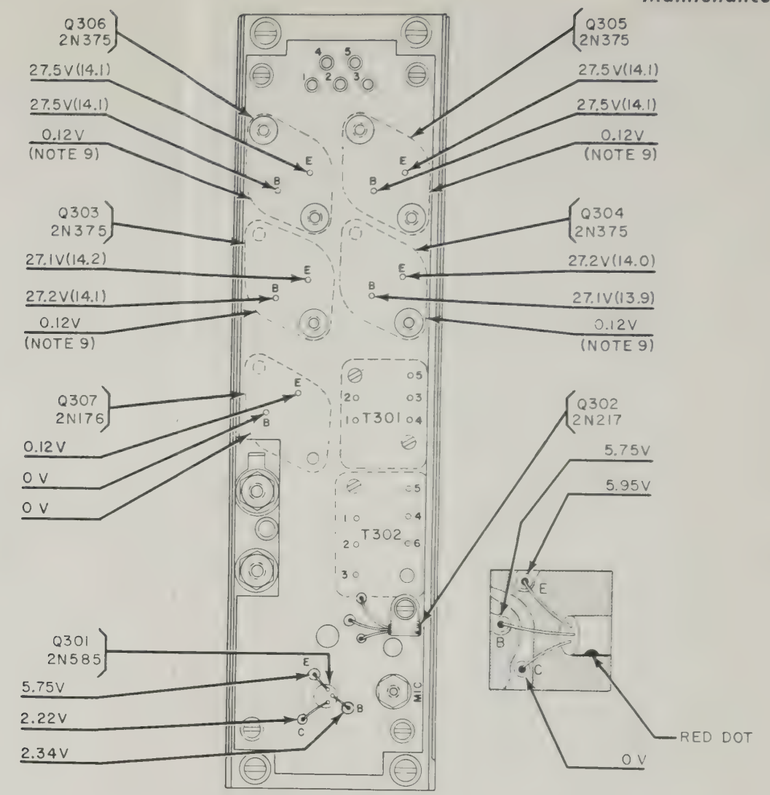


NOTES:

1. VOLTAGES ARE DC AND APPEAR ABOVE THE REFERENCE LINE.

2. RESISTANCES ARE IN OHMS AND APPEAR BELOW THE REFERENCE LINE. MULTIPLIER K=1,000.

3. VOLTAGES ARE MEASURED WITH A 20,000 OHMS-PER-VOLT VOLTMETER, SUCH AS SIMPSON MODEL 260 MULTIMETER, THE D-C VOLTMETER IN THE H-25A, OR EQUIVALENT. VOLTAGES ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   (A) EQUIPMENT CONNECTED AS SHOWN IN FIGURE 5-7 OR 5-8. THE TEST CONDITIONS OF PARAGRAPH 5-5 AND THE PRELIMINARY PROCEDURE OF TABLE 5-2 ALSO APPLY.
   (B) VOLTAGES ARE POSITIVE DC AND ARE MEASURED WITH RESPECT TO CHASSIS GROUND, UNLESS OTHERWISE NOTED.
   (C) CHANNEL SELECTOR SWITCHES SET TO 135.00 MC.
   (D) MEASUREMENTS MADE WITH NO R-F CARRIER MODULATION.
   (E) HEATER OR TRANSISTOR VOLTAGES SHOWN IN PARENTHESES ARE FOR 14-VOLT MODEL.



BOTTOM VIEW

4. RESISTANCE VALUES ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   (A) CABLES DISCONNECTED FROM T-25A TRANSMITTER.
   (B) MEASUREMENTS MADE FROM PIN INDICATED TO CHASSIS GROUND, UNLESS OTHERWISE NOTED. NEGATIVE PROBE OF OHMMETER GROUNDED TO CHASSIS.
   (C) HEATER RESISTANCES SHOWN IN PARENTHESES ARE FOR 14-VOLT MODEL.

5. TERMINALS DESIGNATED NC = NO CONNECTION.

6. NO SIGNIFICANT MEASUREMENT CAN BE MADE.

7. SET WHISTLE-THROUGH SWITCH TO ON FOR THIS MEASUREMENT ONLY.

8. FOR AN EQUIVALENT MEASUREMENT, SEE TEST POINT VOLTAGE IN TABLE 5-6.

9. THE CASES (COLLECTORS) OF Q303, Q304, Q305, AND Q306 ARE INSULATED FROM CHASSIS GROUND AND CONNECTED TOGETHER BY A MOUNTING PLATE.

TP1775

Figure 5–12. T-25A Transmitter, Voltage and Resistance Measurements

5–9. DV-12A DYNAVERTER MAINTENANCE.

General. Since the ARC Type DV-12A Dynaverter has no moving parts, periodic maintenance is not necessary. The following instructions will aid in isolating the cause of defective operation should a transistor or other part fail in service.

Test Equipment. The following test equipment, or equivalent, is needed to test the Dynaverter:

Variable, Filtered D-c Power Supply, 0–28 volts, 5 amperes, Electro Products Laboratories, Inc., Model NF
Multimeter, Simpson Model 260 (20,000 ohms-per-volt)
Milliammeter, 0–200 ma dc, Weston Model 301
Resistor, 2600 ohms, 50 watts

If the output of the power supply is not metered, a 0- to 30-volt voltmeter and a 0- to 5-ampere ammeter will be needed to measure the input voltage and current of the Dynaverter being tested.

Performance and Trouble Analysis. Table 5–7 outlines the procedure for checking and trouble-shooting the Dynaverter. A test circuit for the performance check is shown in Figure 5–13.

Caution

To avoid damaging the Dynaverter, observe proper polarity when connecting the Dynaverter to the primary power source. Connect the frame (ground) of the Dynaverter to the negative terminal of the primary power source.

Repair and Replacement. Figure 5–21 shows the location of detail parts. For access to these parts, the DV-12A should be disassembled partially as follows:

Step 1. Remove the two screws fastening the transparent cover and the bottom end of the terminal board subassembly to the front of the main frame. Remove the transparent cover.

Step 2. Unsolder the green (base) lead of power transistor Q301 which is connected to the center of three terminals located at the right edge of the terminal board (viewed from front).

Step 3. Remove the two screws fastening the upper end of the terminal board to the main frame.

Step 4. Displace the terminal board and its cabling by swinging the board up and outward to the left side of the Dynaverter (viewed from the front).

Step 5. To reassemble, reverse the procedure of Steps 1 through 4.

Localization of Trouble. Use a Simpson Model 260 Multimeter, or equivalent, for continuity and resistance checks. The transistors and diodes are the most probable sources of trouble. Using the multimeter, check the forward and back resistances of the diodes. The back resistance should be much greater than the forward resistance in each case. Specific resistances will depend on the meter and the meter scale used. For the transistors, the resistance as measured from emitter to collector (common test prod from multimeter connected to emitter lead, plus test prod connected to collector) should be much less than the resistance measured in the opposite direction. Similarly, the resistances measured from base to emitter and from base to collector should be much less than those in the opposite directions.

Note

The transistors used in the Dynaverter are special types. Transistors ARC-20454 and ARC-21153 used in the 28-volt and 14-volt models, respectively, are identical to the 2N174 and 2N173 transistors, respectively, except that stranded leads are supplied instead of terminal pins. The base lead has green insulation; the collector is internally grounded to the case.

If it is necessary to replace a transistor, use a 5/16-inch, open-end wrench to loosen the nut securing the transistor to the main frame. Before mounting, apply a thin coating of Dow-Corning 200 Silicone Fluid (1000 centistokes) to the underside of the new transistor. When soldering or unsoldering a diode lead, hold the diode lead with pliers between the solder joint and the diode. The pliers form a heat sink and prevent excessive heat from damaging the unit. The location and proper polarity of each diode are shown in the wiring diagram, Figure 6–13.

5–10. C-82A CONTROL UNIT MAINTENANCE.

Maintenance of the C-82A Control Unit consists of visual inspection of internal connections, visual inspection of the connector pin plugs, and lubrication of the channel selector switches (paragraph 5-4). With the exception of channel selector switch assembly S201 (or equivalent Channel Selector Switch ARC-20730 or ARC Type CC-10A Custom Control Unit), all parts may be replaced in the field.

If the channel selector switch assembly becomes defective, replace the C-82A and return the defective unit to the factory for servicing.

Caution

Excessive soldering iron heat applied to the terminals on the printed circuit plates of the channel selector switch assembly will affect the position and pressure of the contact springs.

TABLE 5–7. DV-12A PERFORMANCE AND TROUBLE ANALYSIS CHECK CHART

Step	Procedure	Normal Indication	Possible Cause of Abnormal Indication
1	Turn on the low-voltage d-c power supply and adjust it for zero output. Interconnect Dynaverter, power supply, meters, and load resistor as shown in Figure 5–13. Check polarity of input connections to the Dynaverter before proceeding.	All meters read zero. **Note** If the low-voltage power supply does not contain meters to measure its output voltage and current, a 30-volt dc voltmeter and a 5-ampere dc ammeter must be connected to read the voltage and current input to the Dynaverter.	
2	Slowly increase input voltage to the Dynaverter until Dynaverter starts. **Note** Do not continue to increase input voltage if input current reaches 1 ampere before Dynaverter starts. Record input voltage and current when the Dynaverter starts.	*28 V Model:* Input voltage approximately 6 volts; input current approximately 0.2 ampere. *14 V Model:* Input voltage approximately 3 volts; input current approximately 0.4 ampere.	Shorted transistor or short circuit in secondary circuit of Dynaverter.
3	Slowly increase input to 30 volts for the 28-volt model or to 15 volts for the 14-volt model. Watch for excessive input current. **Note** Discontinue test if input current exceeds 1.5 amperes to 28-volt model or 3.0 amperes to 14-volt model. Record input current, output voltage, and output current for 30 volts input to the 28-volt model or for 15 volts input to the 14-volt model. Reduce input voltage to zero and disconnect Dynaverter.	*28 V Model:* Approximately 1.3 amperes input current, 300 volts output voltage, and 110 ma output current. *14 V Model:* Approximately 2.7 amperes input current, 325 volts output voltage, and 125 ma output current.	*Excessive input current:* Transistor breakdown or C403 shorted. *Reduced output:* Shorted diode; one side of transformer secondary grounded.

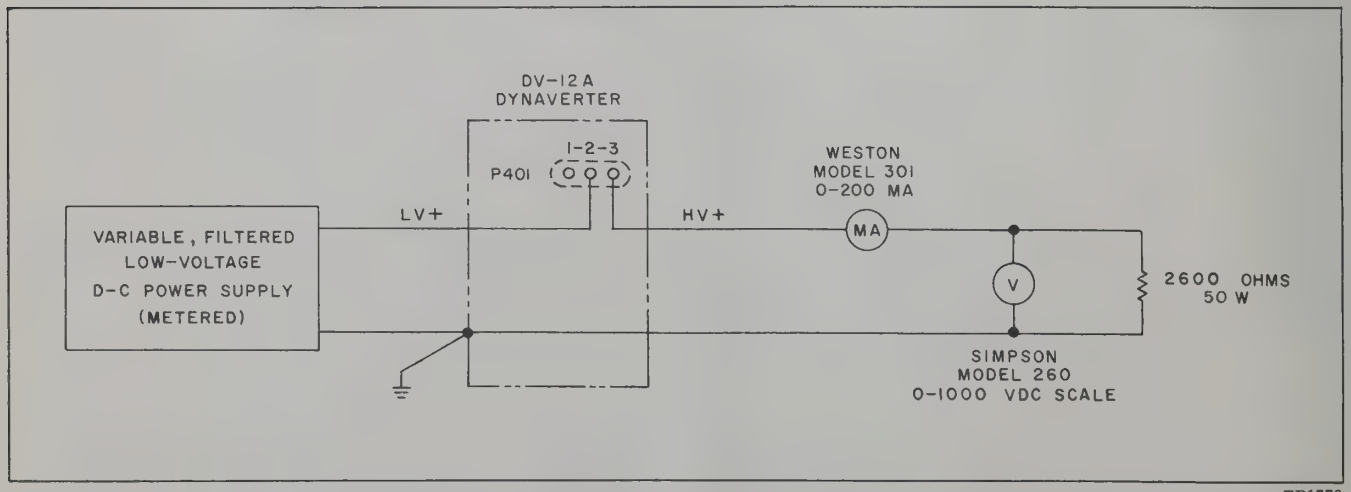


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Figure 5–13. Circuit for Dynaverter Performance Check

TP1352

Figure 5–14. T-25A Transmitter, Top Interior View

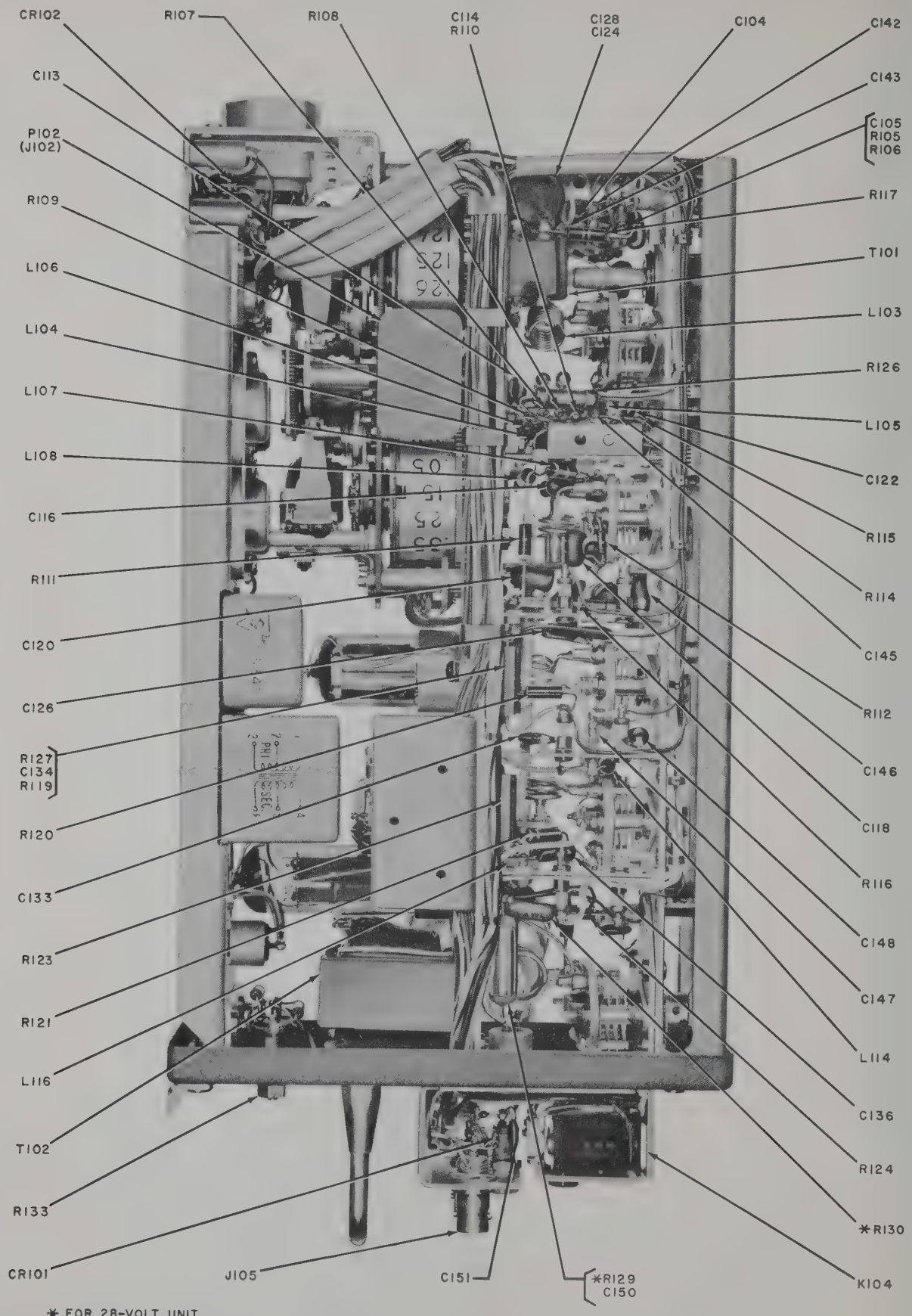
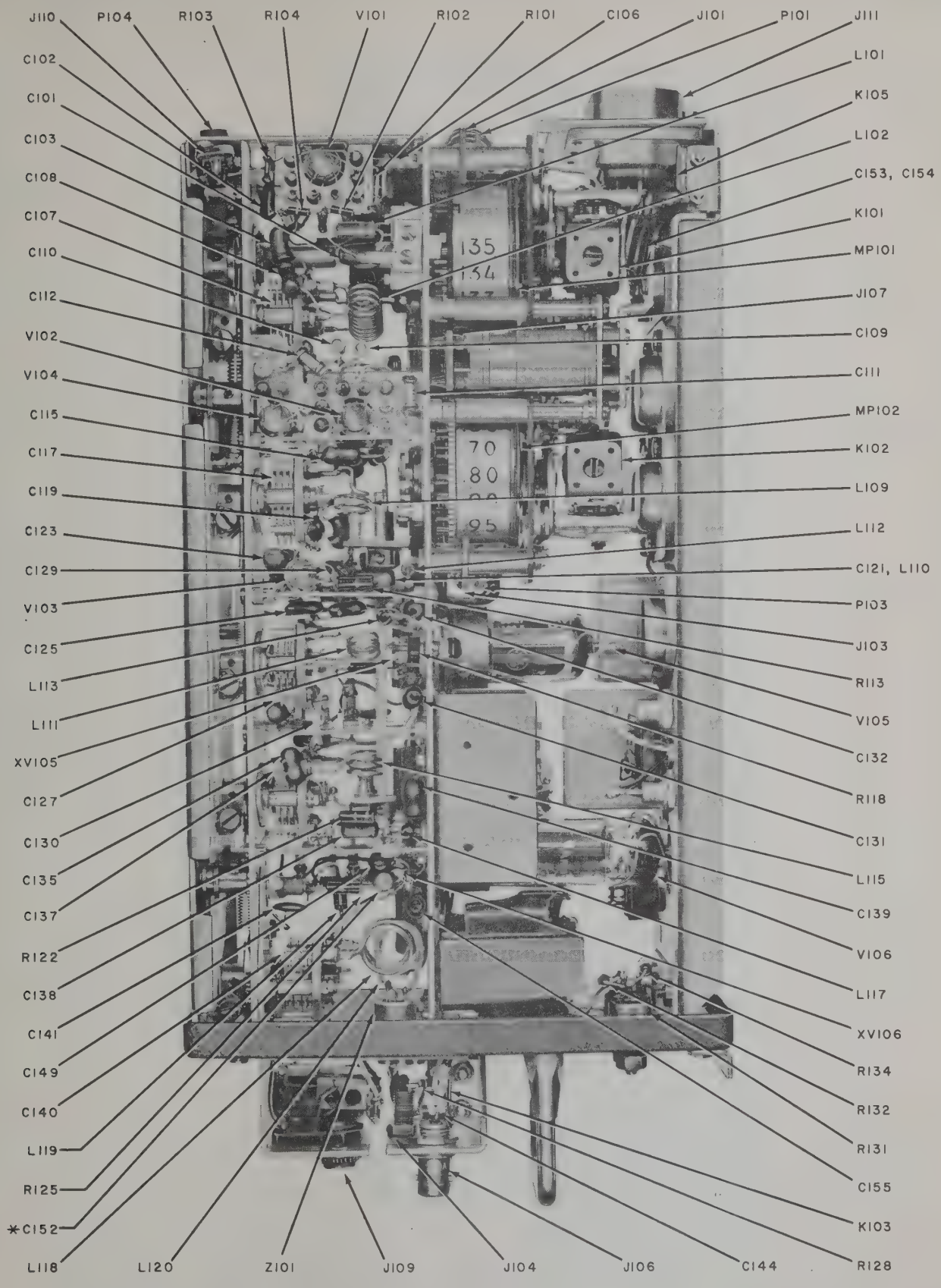


Figure 5–15. T-25A Transmitter, Left Interior View

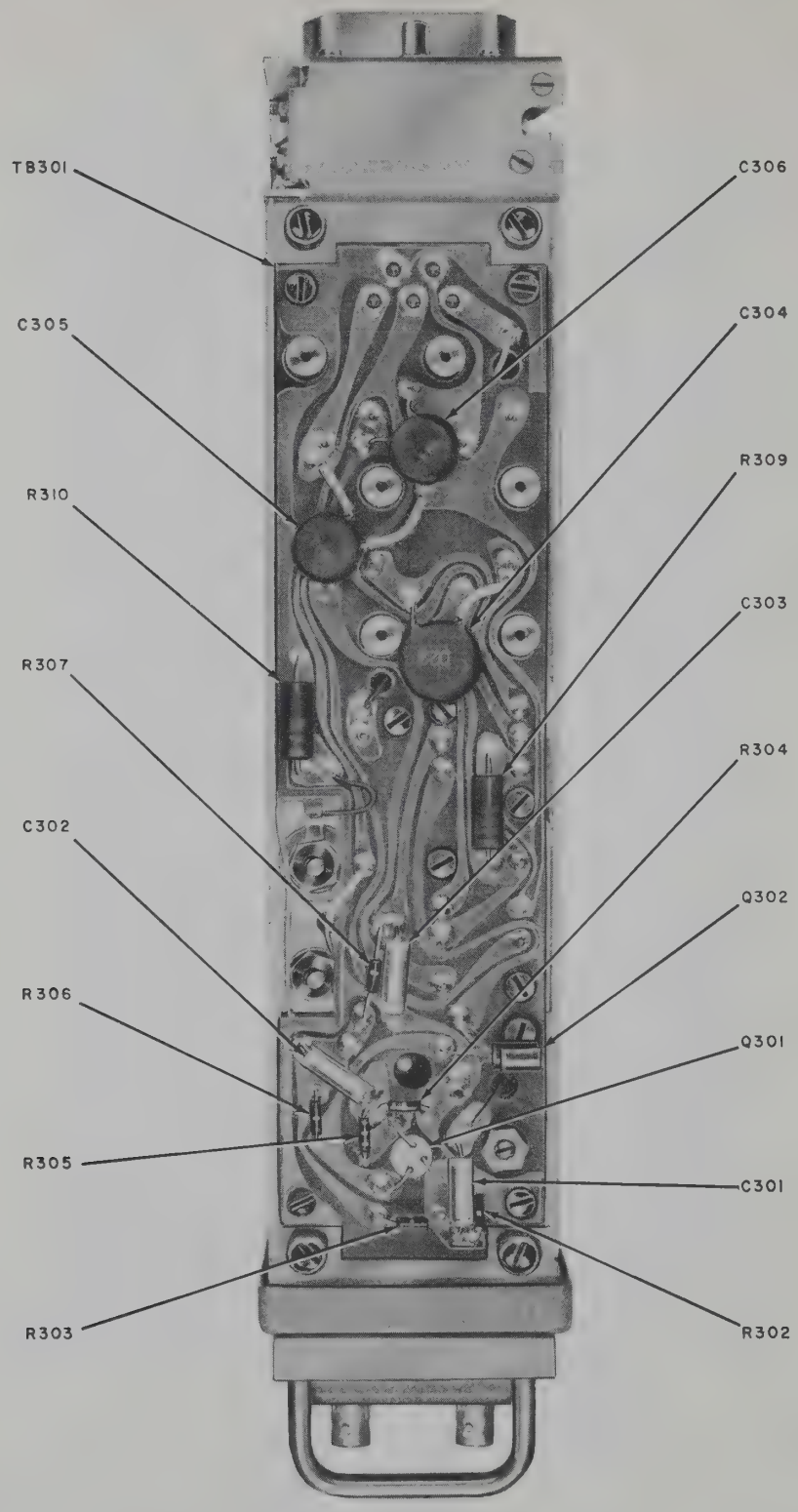
TP1354



* FOR 28-VOLT UNIT.

TP1356

Figure 5–16. T-25A Transmitter, Right Interior View



TP1358

Figure 5–17. T-25A Transmitter, Bottom Interior View

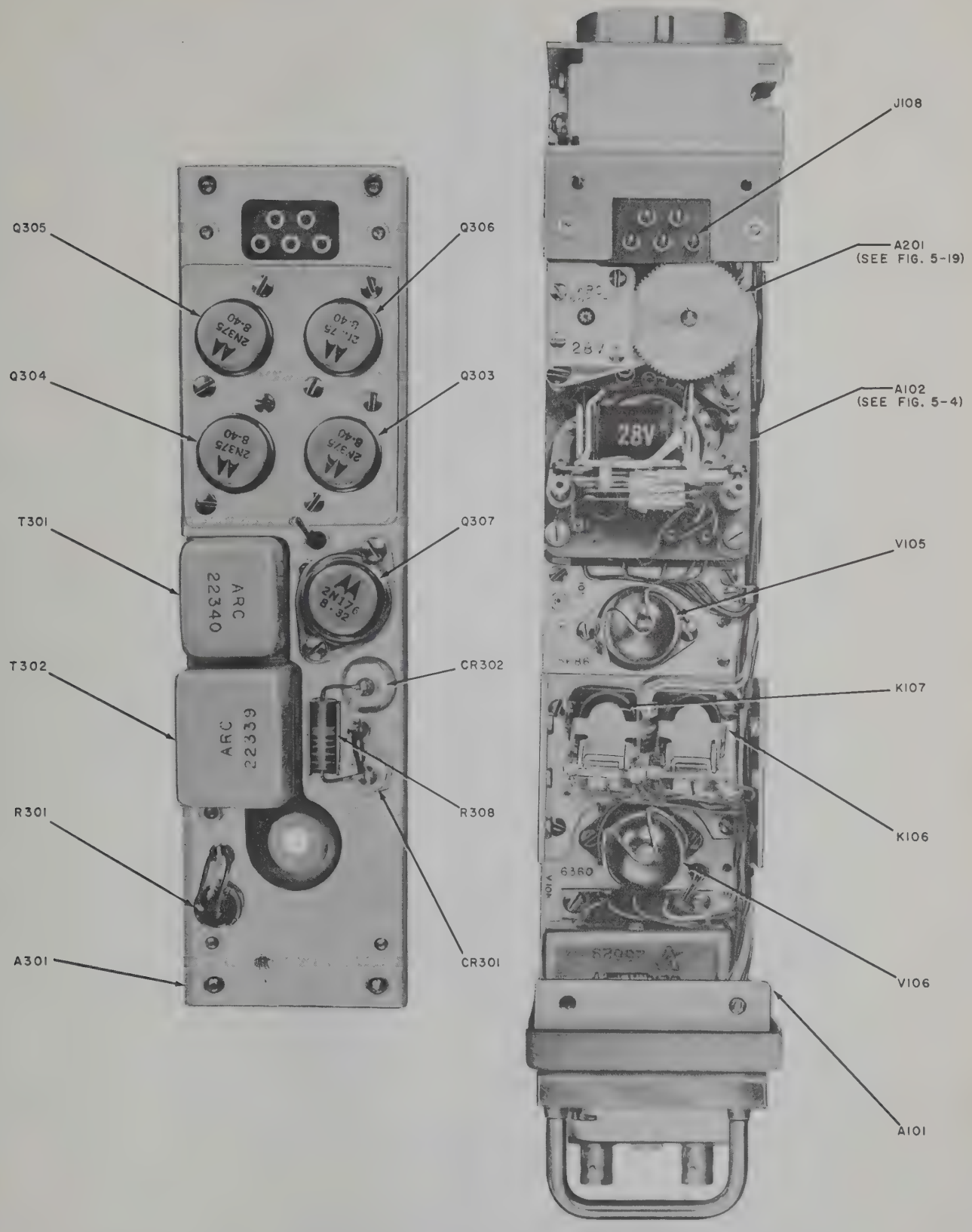
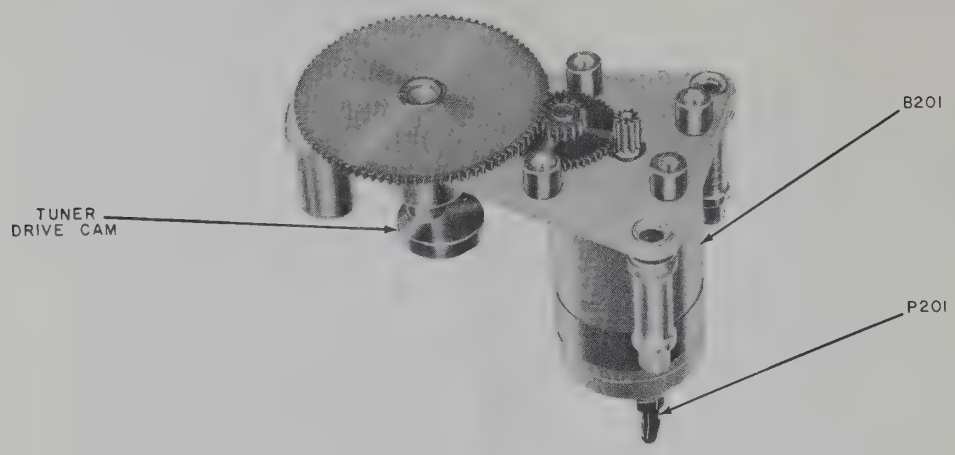
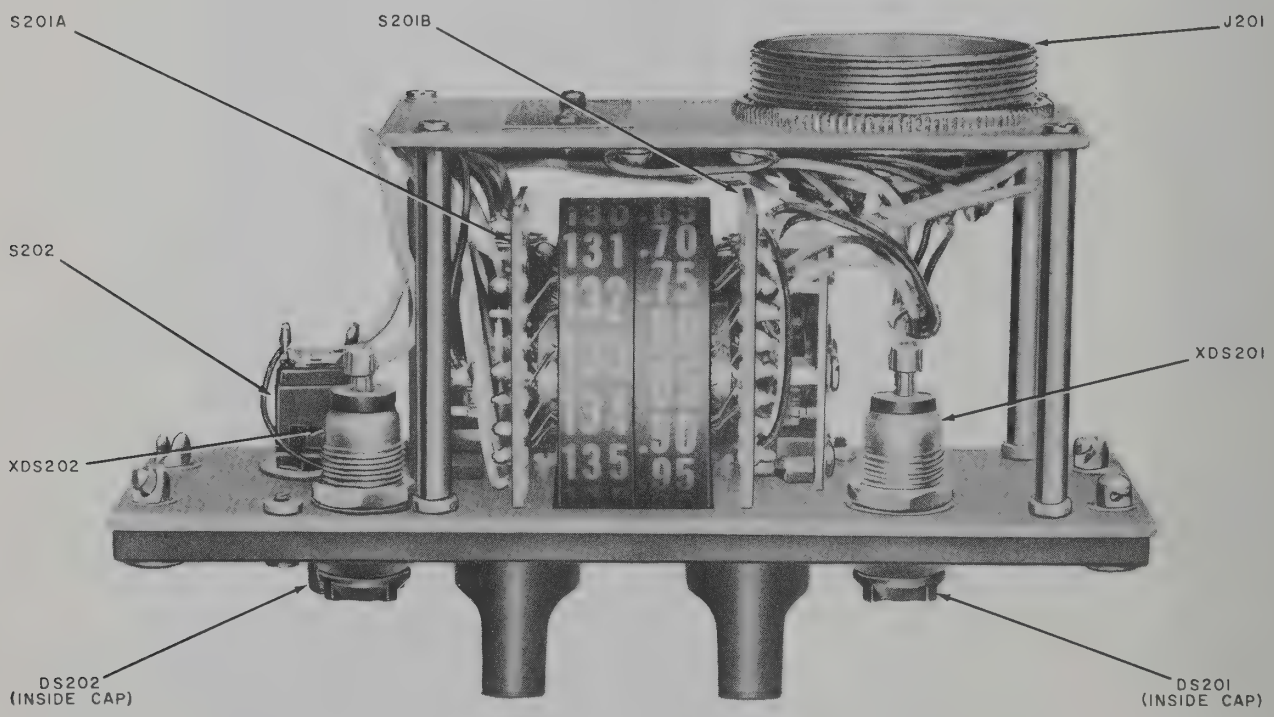


Figure 5–18. T-25A Transmitter, Bottom Interior View, Modulator Assembly Removed



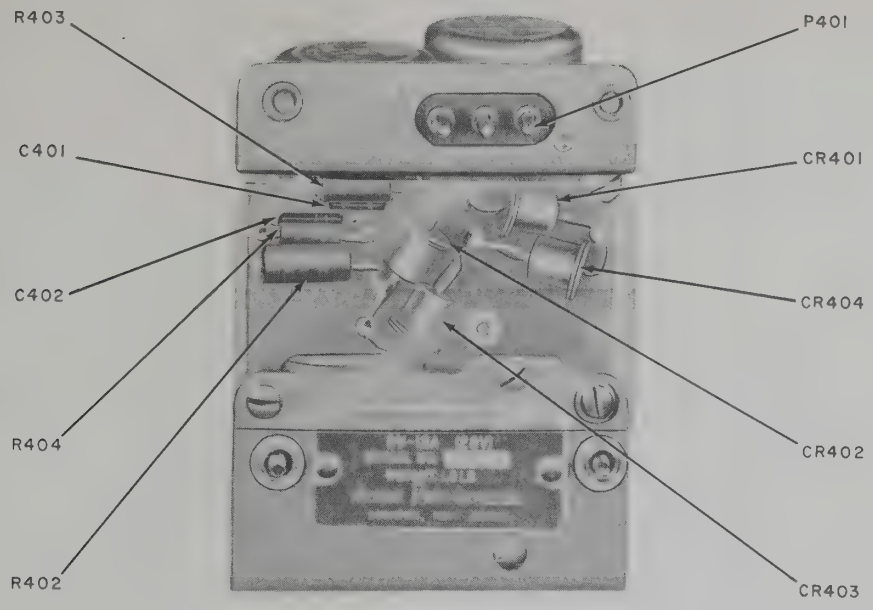
TP1362

Figure 5–19. T-25A Transmitter, Gearing Assembly, Top View, Mounting Bracket Removed

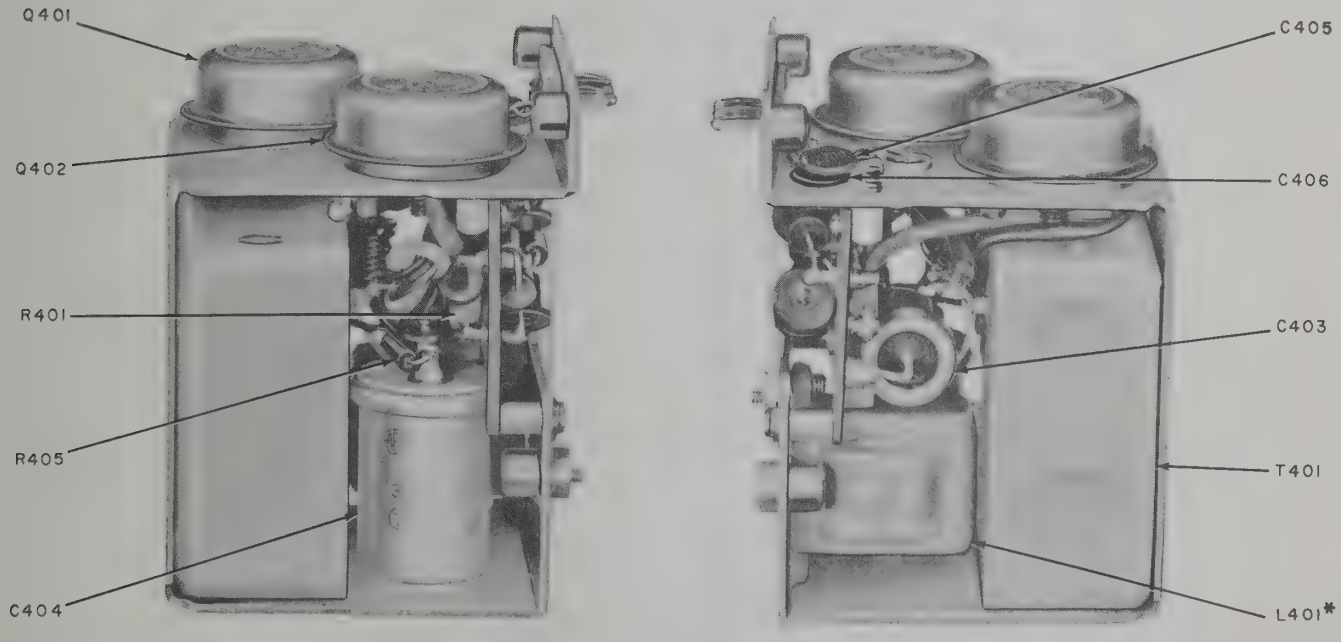


TP1366

Figure 5–20. C-82A Control Unit, Interior View



FRONT VIEW



*FOR 28-VOLT UNIT

LEFT VIEW

RIGHT VIEW

Figure 5–21. DV-12A Dynaverter, Location of Parts

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SECTION VI

DIAGRAMS

Figure 6–1. T-25A Transmitter, Schematic Diagram

Figure 6–2. T-25A Transmitter, Wiring Diagram

Figure 6–3. Transmitter Assembly, Wiring Diagram

Figure 6–4. Tuner Assembly, Wiring Diagram

Figure 6–5. Megacycle Crystal Oscillator-Doubler, Wiring Diagram

Figure 6–6. Fractional Megacycle Oscillator-Mixer and Tone Oscillator, Wiring Diagram

Figure 6–7. R-f Amplifier, Wiring Diagram

Figure 6–8. R-f Driver Amplifier, Wiring Diagram

Figure 6–9. R-f Power Amplifier, Wiring Diagram

Figure 6–10. Modulator Assembly, Wiring Diagram

Figure 6–11. Modulator Printed-circuit Assembly, Wiring Diagram

Figure 6–12. DV-12A Dynaverter, Schematic Diagram

Figure 6–13. DV-12A Dynaverter, Wiring Diagram

Figure 6–14. C-82A Control Unit, Schematic Diagram

Figure 6–15. C-82A Control Unit, Wiring Diagram

Figure 6–16. C-82A Control Unit, Continuity Sequence Table

Figure 6–17. Channel Selector Switch ARC-20730, Schematic Diagram

Figure 6–18. Channel Selector Switch ARC-20730, Wiring Diagram

Figure 6–19. CC-10A Custom Control Unit, Schematic Diagram

Figure 6–20. CC-10A Custom Control Unit, Wiring Diagram

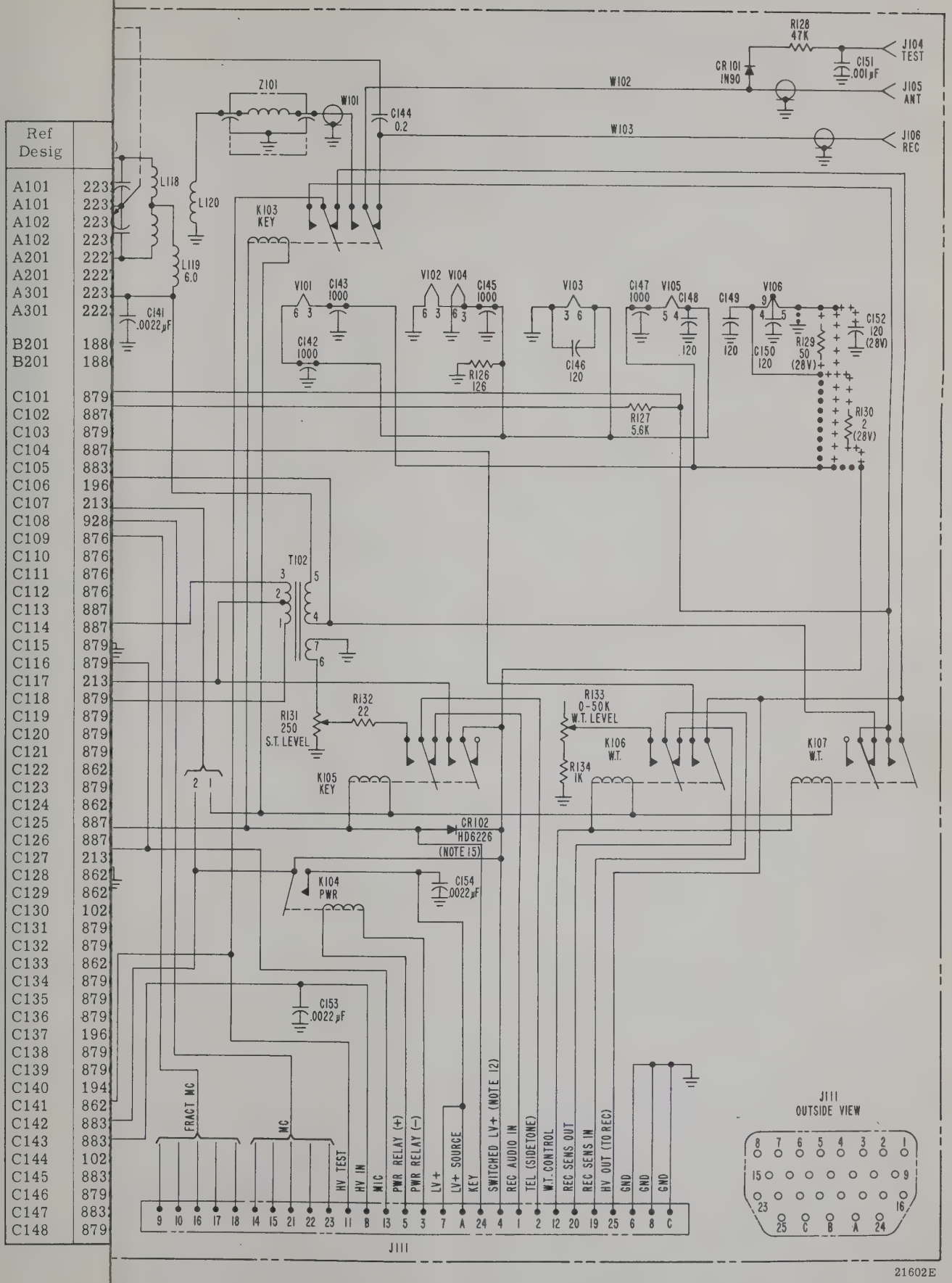

Figure 6–1. T-25A Transmitter, Schematic Diagram

SECTION VI

DIAGRAMS

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Figure 6–8. R-f Driver Amplifier, Wiring Diagram

Figure 6–9. R-f Power Amplifier, Wiring Diagram

Figure 6–10. Modulator Assembly, Wiring Diagram

Figure 6–11. Modulator Printed-circuit Assembly, Wiring Diagram

Figure 6–12. DV-12A Dynaverter, Schematic Diagram

Figure 6–13. DV-12A Dynaverter, Wiring Diagram

Figure 6–14. C-82A Control Unit, Schematic Diagram

Figure 6–15. C-82A Control Unit, Wiring Diagram

Figure 6–16. C-82A Control Unit, Continuity Sequence Table

Figure 6–17. Channel Selector Switch ARC-20730, Schematic Diagram

Figure 6–18. Channel Selector Switch ARC-20730, Wiring Diagram

Figure 6–19. CC-10A Custom Control Unit, Schematic Diagram

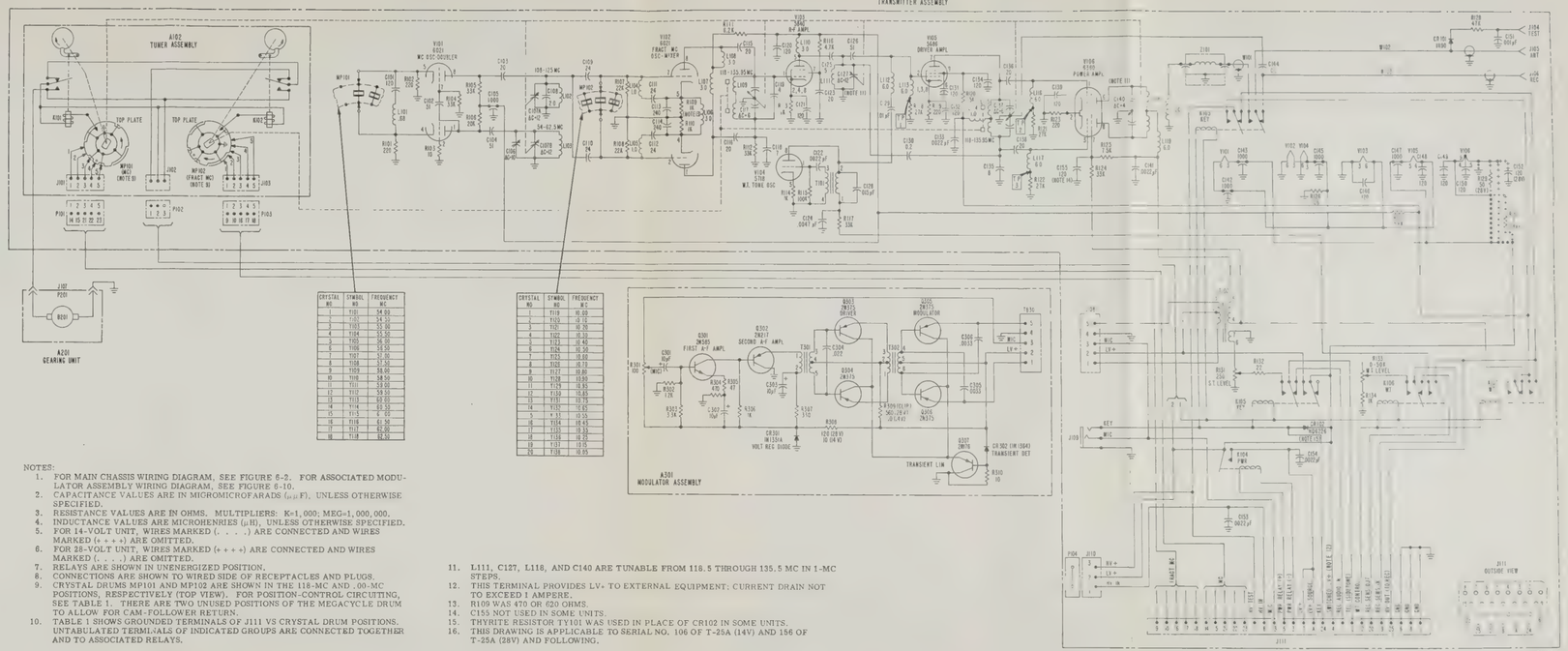
Figure 6–20. CC-10A Custom Control Unit, Wiring Diagram

ARC PART NO.

Ref Desig	ARC Part No.
A101	22328-0014
A101	22328-0028
A102	22367-0014
A102	22367-0028
A201	22277-0014
A201	22277-0028
A301	22337-0014
A301	22237-0028
B201	18800
B201	18801
C101	8796-0121
C102	8870-0510
C103	8791-0200
C104	8870-0510
C105	8832
C106	19603
C107	21326
C108	9280
C109	8765-0240
C110	8765-0240
C111	8765-0240
C112	8765-0240
C113	8870-0241
C114	8870-0241
C115	8791-0200
C116	8791-0200
C117	21326
C118	8791-9701
C119	8791-9401
C120	8796-0121
C121	8796-0121
C122	8625-9224
C123	8796-0121
C124	8625-9224
C125	8870-0510
C126	8870-0510
C127	21326
C128	8627-9153
C129	8627-9103
C130	10281
C131	8796-0121
C132	8796-0121
C133	8625-9224
C134	8796-0121
C135	8791-9801
C136	8791-0200
C137	19639
C138	8791-0200
C139	8796-0121
C140	19420
C141	8625-9224
C142	8832
C143	8832
C144	10281
C145	8832
C146	8796-0121
C147	8832
C148	8796-0121
C149	8796-0121
C150	8796-0121
C151	8625-9104
C152	8796-0121
C153	8625-9224
C154	8625-9224
C155	8796-0121
C301	8914-0100
C302	8914-0100
C303	8914-0100
C304	8627-9223
C305	8626-9334
C306	8626-9334
CR101	19663
CR102	23037
CR301	8923-0100
CR302	22298-0360
J101	19336
J102	p/o 19669 and 19661
J103	19336
J104	8803-5410
J105	15185
J106	15185
J107	p/o 19669
J108	21873
J109	9391
J110	22153
J111	21984
K101	19664
K101	19685
K102	19664
K102	19665
K103	22276-0014
K103	22276-0028
K104	14484
K104	14485
K105	22276-0014
K105	22276-0028
K106	12587
K106	12588
K107	12587
K107	12588
L101	8877-9682
L102	19620
L103	19923
L104	8877-9101
L105	8877-9101
L106	14141
L107	14141
L108	14141
L109	19575
L110	14141
L111	19620
L112	22097
L113	22097
L114	22097
L115	22142
L116	22206
L117	22206
L118	21833
L119	22206
L120	p/o 22147
MP101	p/o 22367-0014
MP101	p/o 22367-0028
MP102	p/o 22367-0014
MP102	p/o 22367-0028
P101	19339
P102	22130
P103	19339
P104	22151
P201	p/o 18800
P201	p/o 18801
Q301	22292
Q302	22293
Q303	22289
Q304	22289
Q305	22289
Q306	22289
Q307	22290
R101	200-0221
R102	200-0221
R103	204-0100
R104	200-0333
R105	201-0333
R106	201-0203
R107	200-0223
R108	200-0223
R109	200-0102
R110	200-0822
R111	201-0622
R112	200-0333
R113	201-0102
R114	200-0102
R115	200-0104
R116	201-0472
R117	201-0333
R118	201-0273
R119	200-0221
R120	201-0153
R121	201-0273
R122	201-0273
R123	203-0221
R124	201-0333
R125	201-0752
R126	209-0006
R127	203-0562
R128	200-0473
R129	201-0332
R130	209-0009
R131	200-0681
R132	201-0102
R301	8915-0101
R302	200-0122
R303	200-0332
R304	200-0471
R305	200-0470
R306	200-0102
R307	200-0331
R308	203-0100
R308	203-0121
R309	202-0100
R309	202-0561
R310	202-0100
T101	18052
T102	22195-0014
T102	22195-0028
T301	22340
T302	22339
TB301	22334
V101	700-0136
V102	700-0136
V103	700-0129
V104	700-0122
V105	700-0121
V106	700-0204
W101	18327
W102	18327
W103	18327
XV105	21547
XV106	21547
Y101	19658-5400
Y102	19658-5450
Y103	19658-5500
Y104	19658-5550
Y105	19658-5600
Y106	19658-5650
Y107	19658-5700
Y108	19658-5750
Y109	19658-5800
Y110	19658-5850
Y111	19658-5900
Y112	19658-5950
Y113	19658-6000
Y114	19658-6050
Y115	19658-6100
Y116	19658-6150
Y117	19658-6200
Y118	19658-6250
Y119	19657-1000
Y120	19657-1010
Y121	19657-1020
Y122	19657-1030
Y123	19657-1040
Y124	19657-1050
Y125	19657-1060
Y126	19657-1070
Y127	19657-1080
Y128	19657-1090
Y129	19657-1095
Y130	19657-1085
Y131	19657-1075
Y132	19657-1065
Y133	19657-1055
Y134	19657-1045
Y135	19657-1035
Y136	19657-1025
Y137	19657-1015
Y138	19657-1005
Z101	22147

TABLE 1

DIAL	MP102 J111	DIAL	MP101 J111
	9, 10, 16, 17, 18		14, 15, 21, 22, 23
.00	9, 10	118	21, 23
.10	9, 18	119	14, 22
.20	17	120	14, 15, 23
.30	16	121	15, 21
.40	10	122	21, 22
.50	9	123	22, 23
.60	18	124	23
.70	17, 18	125	14
.80	16, 17	126	15
.90	10, 16	127	21
.95	9, 10, 18	128	22
.85	9, 17	129	14, 23
.75	16, 18	130	14, 15
.55	10, 17	131	14, 15, 21
.55	9, 16, 18	132	14, 15, 21, 22
.45	10, 17, 18	133	15, 21, 22, 23
.35	9, 16, 17, 18	134	14, 21, 22, 23
.25	10, 16, 17, 18	135	15, 22, 23
.15	9, 10, 16, 17		14, 21, 23
.05	9, 10, 16		15, 22



CRYSTAL NO.	SYMBOL NO.	FREQUENCY MC.
1	Y101	34.00
2	Y102	34.50
3	Y103	35.00
4	Y104	35.50
5	Y105	36.00
6	Y106	36.50
7	Y107	37.00
8	Y108	37.50
9	Y109	38.00
10	Y110	38.50
11	Y111	39.00
12	Y112	39.50
13	Y113	40.00
14	Y114	40.50
15	Y115	41.00
16	Y116	41.50
17	Y117	42.00
18	Y118	42.50

CRYSTAL NO.	SYMBOL NO.	FREQUENCY MC.
1	Y119	10.00
2	Y120	10.10
3	Y121	10.20
4	Y122	10.30
5	Y123	10.40
6	Y124	10.50
7	Y125	10.60
8	Y126	10.70
9	Y127	10.80
10	Y128	10.90
11	Y129	10.95
12	Y130	10.85
13	Y131	10.75
14	Y132	10.65
15	Y133	10.55
16	Y134	10.45
17	Y135	10.35
18	Y136	10.25
19	Y137	10.15
20	Y138	10.05

NOTES:

1. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 6-2. FOR ASSOCIATED MODULATOR ASSEMBLY WIRING DIAGRAM, SEE FIGURE 6-10.
2. CAPACITANCE VALUES ARE IN MICROMICROFARADS ($\mu\mu$F), UNLESS OTHERWISE SPECIFIED.
3. RESISTANCE VALUES ARE IN OHMS. MULTIPLIERS: K=1,000; MEG=1,000,000.
4. INDUCTANCE VALUES ARE MICROHENRIES (μH), UNLESS OTHERWISE SPECIFIED.
5. FOR 14-VOLT UNIT, WIRES MARKED (. . . .) ARE CONNECTED AND WIRES MARKED (+ + +) ARE OMITTED.
6. FOR 28-VOLT UNIT, WIRES MARKED (+ + +) ARE CONNECTED AND WIRES MARKED (. . . .) ARE OMITTED.
7. RELAYS ARE SHOWN IN UNENERGIZED POSITION.
8. CONNECTIONS ARE SHOWN TO WIRED SIDE OF RECEPTACLES AND PLUGS.
9. CRYSTAL DRUMS MP101 AND MP102 ARE SHOWN IN THE 118-MC AND .00-MC POSITIONS, RESPECTIVELY (TOP VIEW). FOR POSITION-CONTROL CIRCUITING, SEE TABLE 1. THERE ARE TWO UNUSED POSITIONS OF THE MEGACYCLE DRUM TO ALLOW FOR CAM-FOLLOWER RETURN.
10. TABLE 1 SHOWS GROUNDED TERMINALS OF J111 VS CRYSTAL DRUM POSITIONS. UNTABULATED TERMINALS OF INDICATED GROUPS ARE CONNECTED TOGETHER AND TO ASSOCIATED RELAYS.
11. L111, C127, L116, AND C140 ARE TUNABLE FROM 118.5 THROUGH 135.5 MC IN 1-MC STEPS.
12. THIS TERMINAL PROVIDES LV+ TO EXTERNAL EQUIPMENT; CURRENT DRAIN NOT TO EXCEED 1 AMPERE.
13. R109 WAS 470 OR 620 OHMS.
14. C155 NOT USED IN SOME UNITS.
15. THYRITE RESISTOR TY101 WAS USED IN PLACE OF CR102 IN SOME UNITS.
16. THIS DRAWING IS APPLICABLE TO SERIAL NO. 106 OF T-25A (14V) AND 156 OF T-25A (28V) AND FOLLOWING.

Figure 6-1. T-25A Transmitter, Schematic Diagram

NOTES:

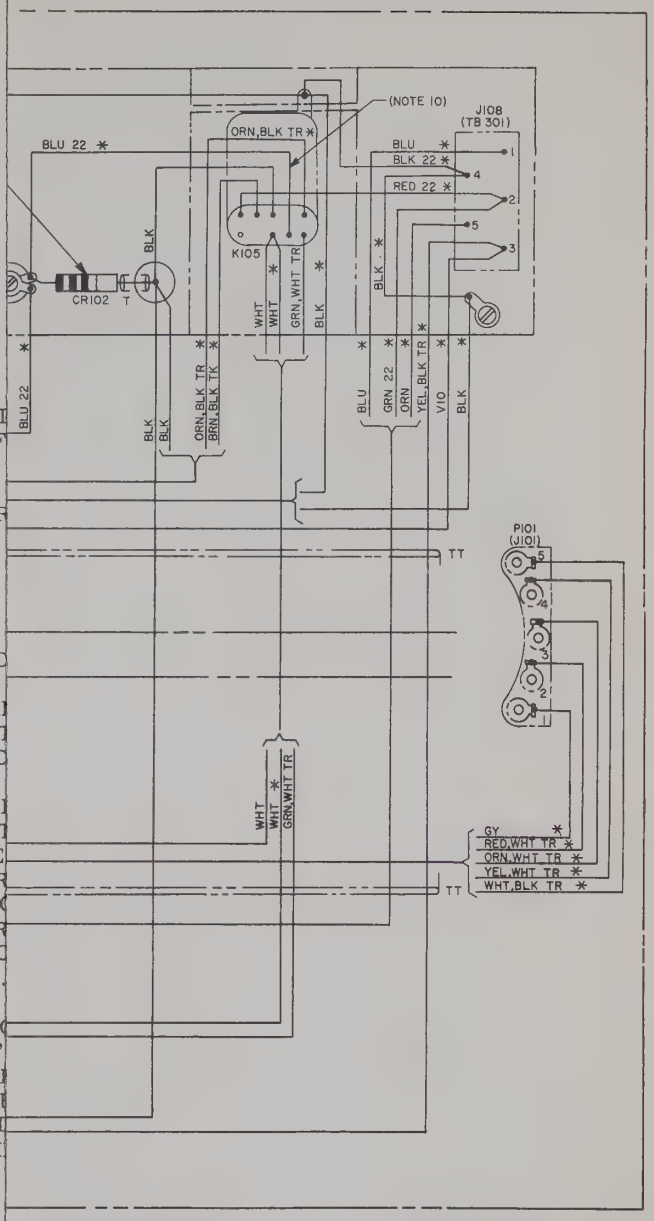
1. FOR SCHEMATIC DIAGRAM, SEE FI
2. ASSOCIATED WIRING DIAGRAMS OF
   ARE AS FOLLOWS:

SYMBOL NO.	ASSEMBLY
A101	TRANSMITTER
A102	TUNER
A301	MODULATOR

3. FOR COMPLETE WIRING, SEE ALL
4. WIRES:

MARKING	
COLOR NOTE	#24 SOLID TION
COLOR NOTE PLUS (*)	#24 STRA SULAT
COLOR NOTE PLUS (22)	#22 SOLID TION
COLOR NOTE PLUS (22*)	#22 STRA SULAT
UNMARKED	#24 BARE

5. FOR 28-VOLT CHASSIS, WIRES MAR
   AND WIRES MARKED (. . . .) ARE
6. FOR 14-VOLT CHASSIS, WIRES MAR
   AND WIRES MARKED (+ + + +) ARE
7. TEFLON TUBING OF .036-INCH I. D.
   MARKED "T."
8. SPIRAL-CUT TUBING OF 1/8-INCH
   GROUPS OF WIRES MARKED "TT."
9. PLUGS AND RECEPTACLES ARE VI
10. TEFLON TUBING (1/4-INCH LENGT
    STALLED OVER WIRES CONNECTE
    PUSHED DOWN OVER RELAY TERM



21601D

Figure 6–2. T-25A Transmitter, Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. ASSOCIATED WIRING DIAGRAMS OF SEPARATE SUBASSEMBLIES ARE AS FOLLOWS:

SYMBOL NO.	ASSEMBLY	FIGURE NO.
A101	TRANSMITTER	6-3
A102	TUNER	6-4
A301	MODULATOR	6-10

3. FOR COMPLETE WIRING, SEE ALL VIEWS.
4. WIRES:

MARKING	DESCRIPTION
COLOR NOTE	#24 SOLID COPPER, TEFLON INSULATION
COLOR NOTE PLUS (*)	#24 STRANDED COPPER, TEFLON INSULATION
COLOR NOTE PLUS (22)	#22 SOLID COPPER, TEFLON INSULATION
COLOR NOTE PLUS (22*)	#22 STRANDED COPPER, TEFLON INSULATION
UNMARKED	#24 BARE, SOLID, TINNED COPPER

5. FOR 28-VOLT CHASSIS, WIRES MARKED (+ + +) ARE CONNECTED AND WIRES MARKED (. . . .) ARE OMITTED.
6. FOR 14-VOLT CHASSIS, WIRES MARKED (. . . .) ARE CONNECTED AND WIRES MARKED (+ + + +) ARE OMITTED.
7. TEFLON TUBING OF .036-INCH I. D. IS INSTALLED OVER WIRE MARKED "T."
8. SPIRAL-CUT TUBING OF 1/8-INCH O. D. IS INSTALLED OVER GROUPS OF WIRES MARKED "TT."
9. PLUGS AND RECEPTACLES ARE VIEWED FROM WIRED SIDE.
10. TEFLON TUBING (1/4-INCH LENGTHS, .091-INCH I. D.) IS INSTALLED OVER WIRES CONNECTED TO K103 AND K105 AND IS PUSHED DOWN OVER RELAY TERMINALS.

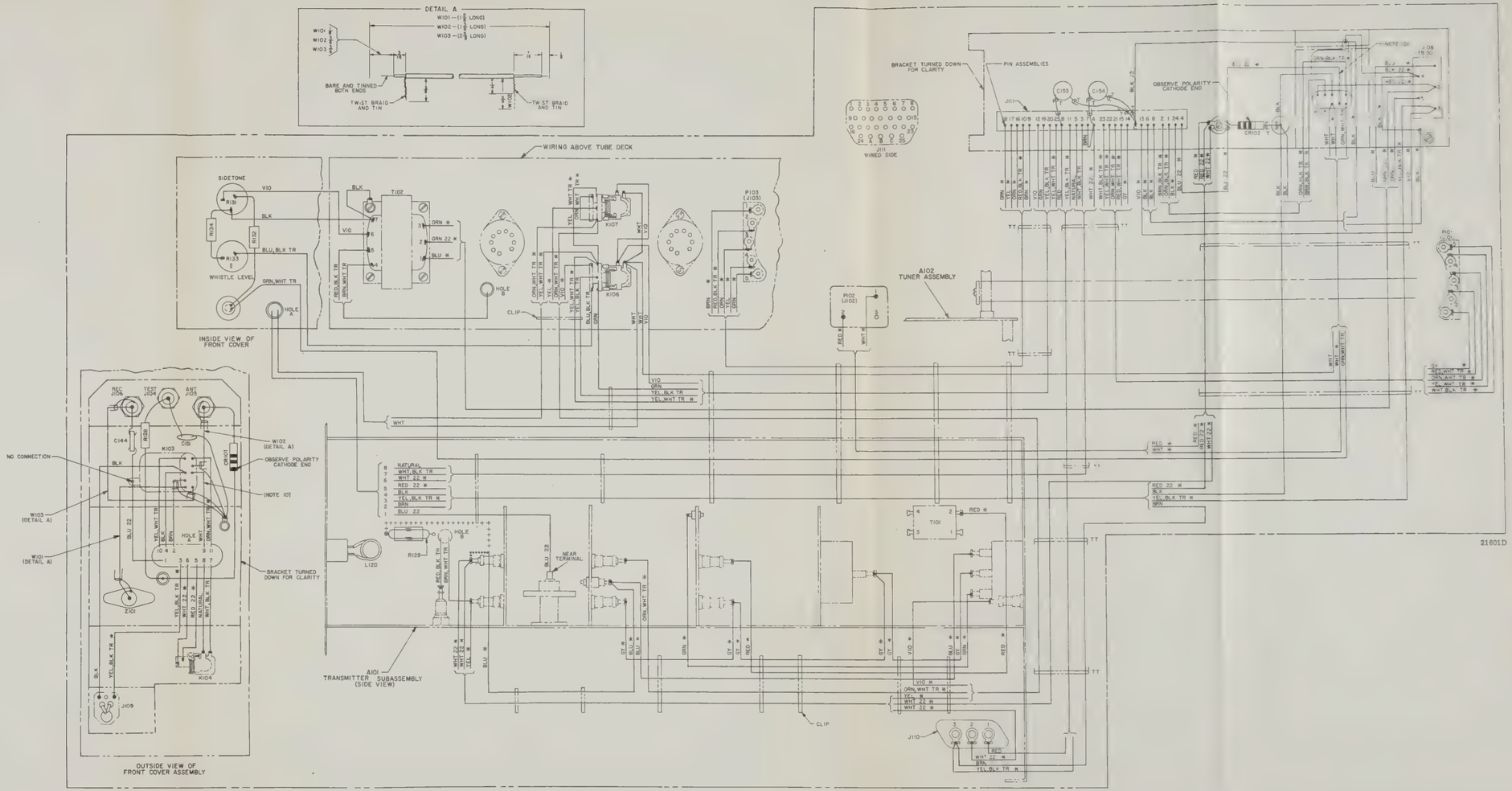
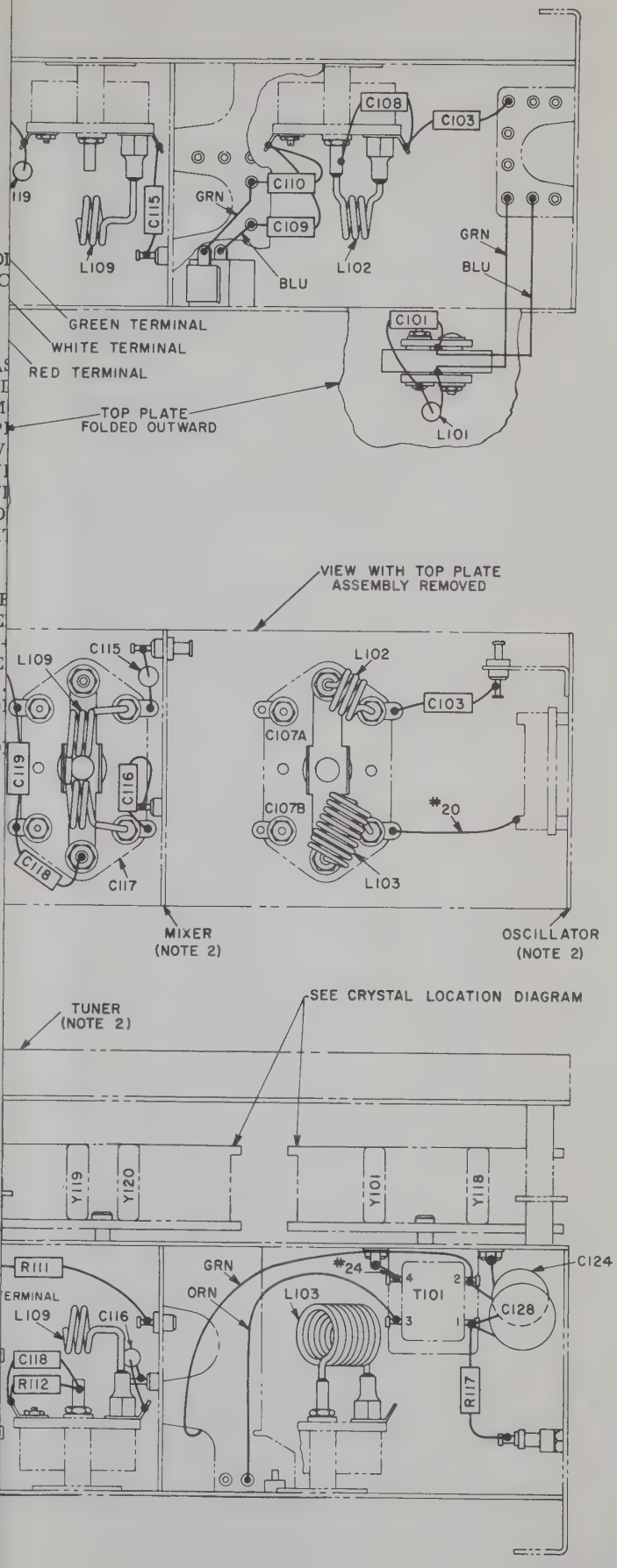


Figure 6–2. T-25A Transmitter, Wiring Diagram

NOTES:

1. FOR SCHEMATIC DI
2. FOR INTERCONNEC
   WIRING DIAGRAM,
   ARE AS FOLLOWS:

   TUNER AS
   MC OSC-I
   FRACT M
   R-F AMP
   R-F DRIV
   R-F POW
3. FOR COMPLETE WI
   DUPLICATED IN SO
4. WIRES MARKED WI
   SULATION.
5. UNMARKED WIRES
   MARKED WITH SIZE
6. FOR 14-VOLT ASSE
   WIRES MARKED (+
7. FOR 28-VOLT ASSE
   WIRES MARKED (.
8. TEFLON TUBING O
   "T."
9. TEFLON TUBING O
   "TT."



22333C

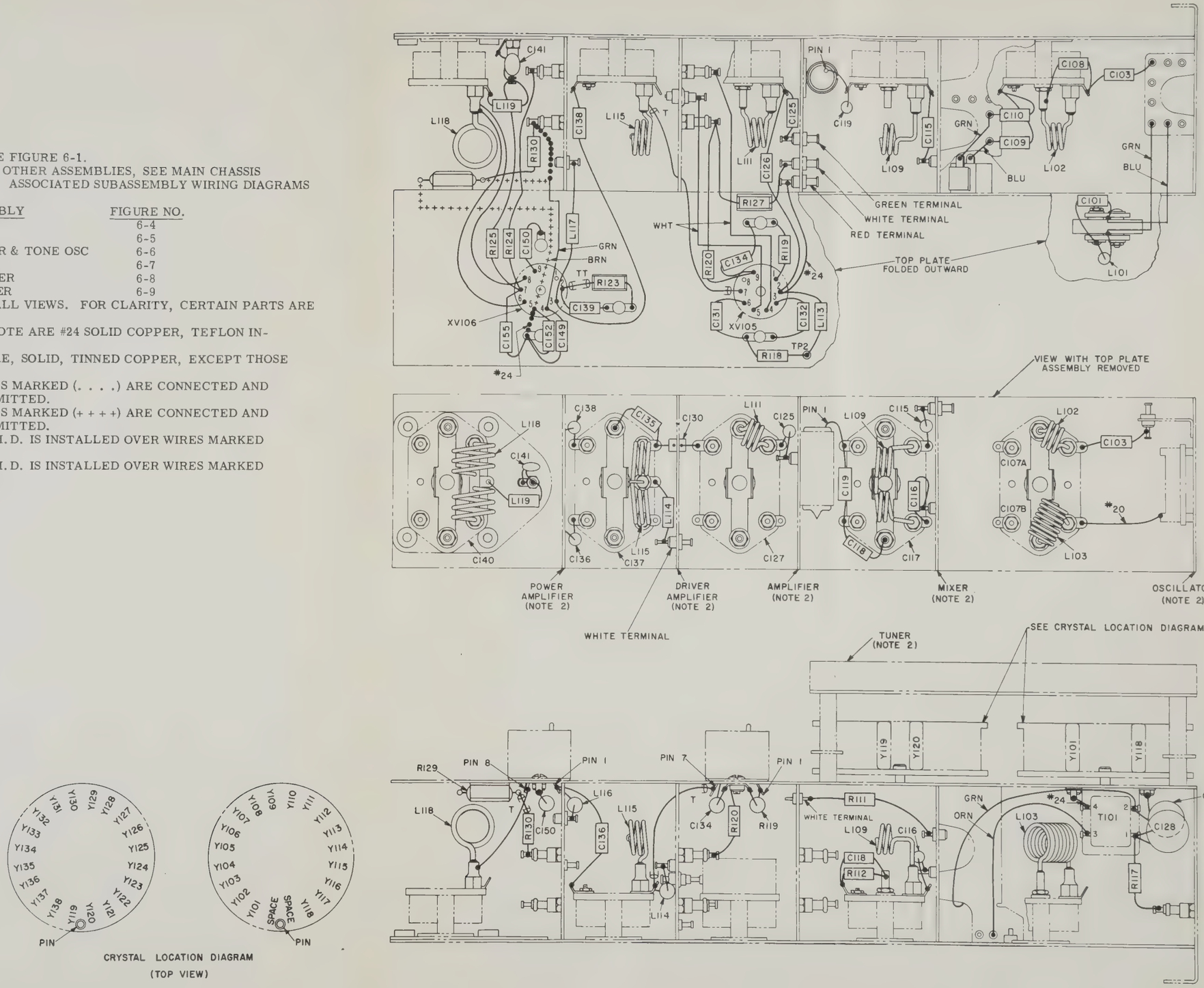
Figure 6–3. Transmitter Assembly, Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. FOR INTERCONNECTIONS WITH OTHER ASSEMBLIES, SEE MAIN CHASSIS WIRING DIAGRAM, FIGURE 6-2. ASSOCIATED SUBASSEMBLY WIRING DIAGRAMS ARE AS FOLLOWS:

SUBASSEMBLY	FIGURE NO.
TUNER ASSEMBLY	6-4
MC OSC-DOUBLER	6-5
FRACT MC OSC-MIXER & TONE OSC	6-6
R-F AMPLIFIER	6-7
R-F DRIVER AMPLIFIER	6-8
R-F POWER AMPLIFIER	6-9

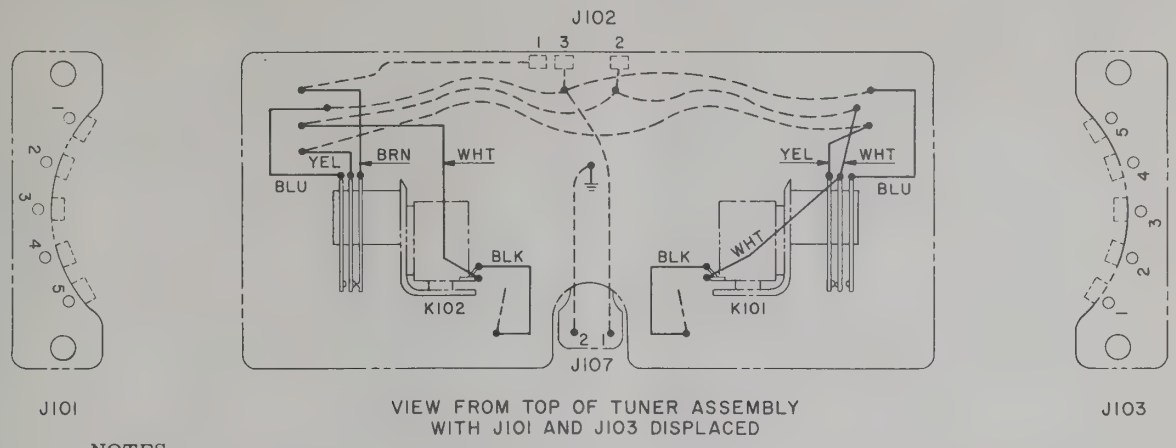
3. FOR COMPLETE WIRING, SEE ALL VIEWS. FOR CLARITY, CERTAIN PARTS ARE DUPLICATED IN SOME VIEWS.
4. WIRES MARKED WITH COLOR NOTE ARE #24 SOLID COPPER, TEFLON INSULATION.
5. UNMARKED WIRES ARE #18 BARE, SOLID, TINNED COPPER, EXCEPT THOSE MARKED WITH SIZE AS SHOWN.
6. FOR 14-VOLT ASSEMBLY, WIRES MARKED (. . . .) ARE CONNECTED AND WIRES MARKED (+ + + +) ARE OMITTED.
7. FOR 28-VOLT ASSEMBLY, WIRES MARKED (+ + + +) ARE CONNECTED AND WIRES MARKED (. . . .) ARE OMITTED.
8. TEFLON TUBING OF .032-INCH I.D. IS INSTALLED OVER WIRES MARKED "T."
9. TEFLON TUBING OF .064-INCH I.D. IS INSTALLED OVER WIRES MARKED "TT."



CRYSTAL LOCATION DIAGRAM
(TOP VIEW)

22333C

Figure 6–3. Transmitter Assembly, Wiring Diagram

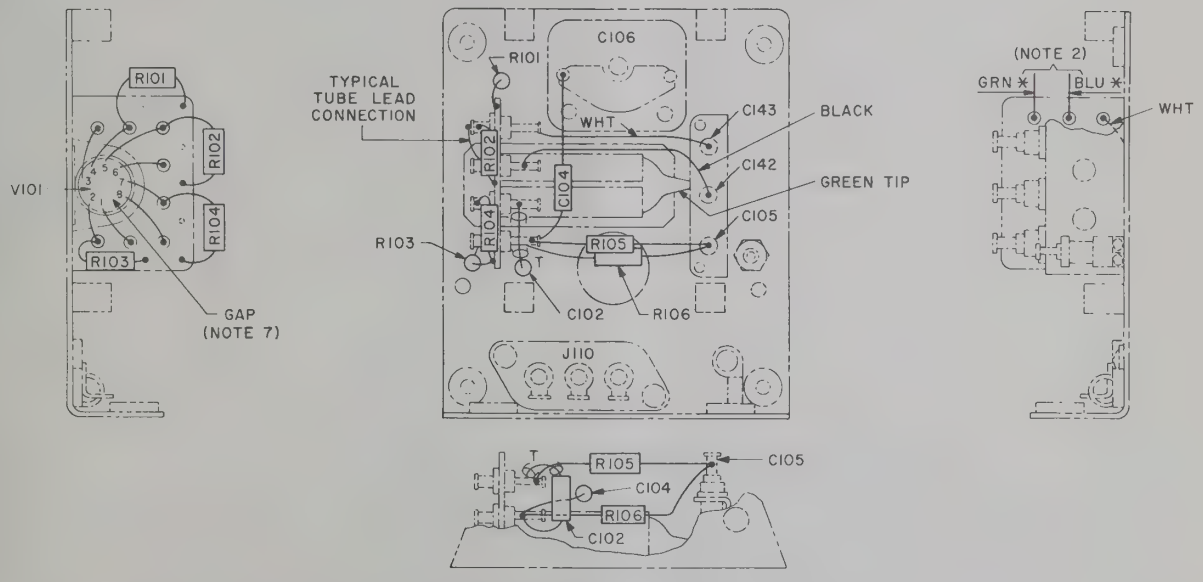


VIEW FROM TOP OF TUNER ASSEMBLY
WITH J101 AND J103 DISPLACED

NOTES:
1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. FOR INTERCONNECTIONS WITH OTHER ASSEMBLIES, SEE ASSOCIATED WIRING DIAGRAMS, FIGURES 6-2 AND 6-3.
3. DOTTED LINES INDICATE PRINTED WIRING.
4. WIRES ARE #24 SOLID COPPER, TEFLON INSULATION.

22368B

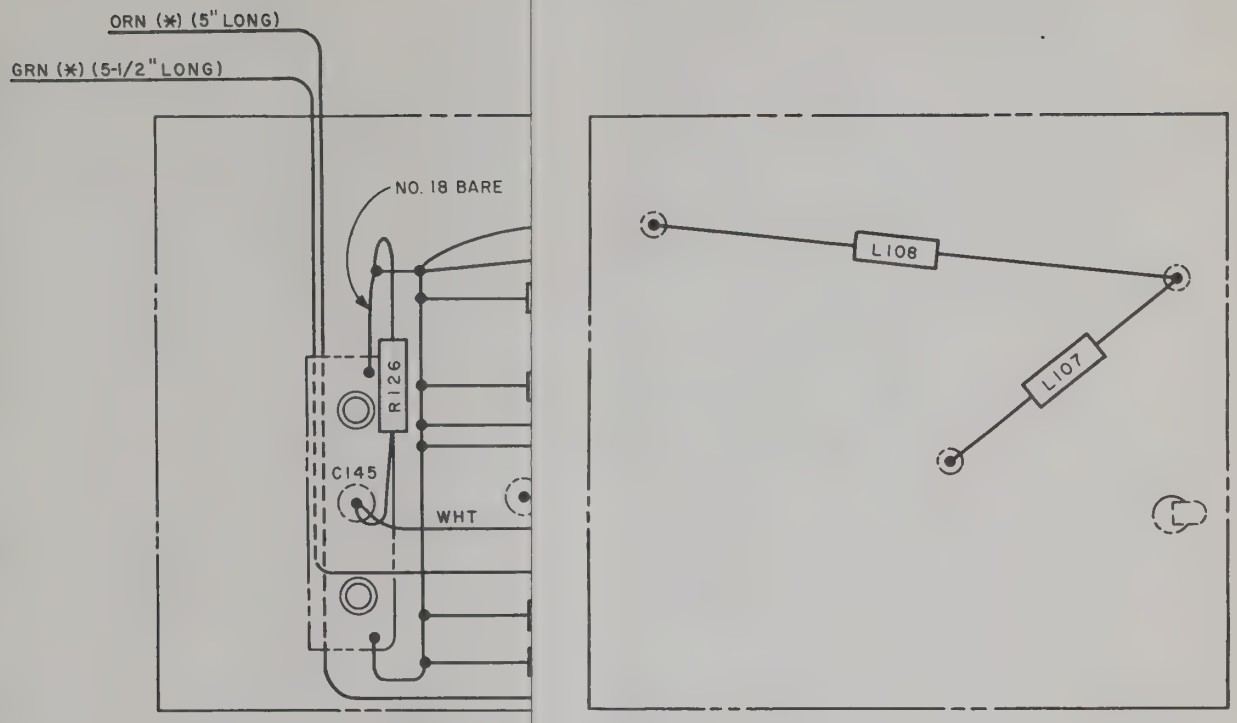
Figure 6–4. Tuner Assembly, Wiring Diagram

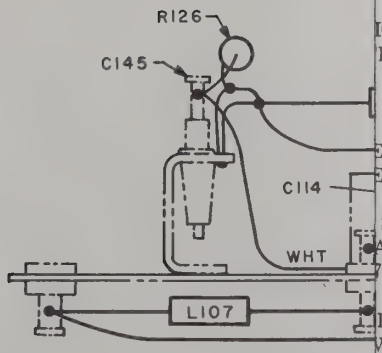


NOTES:
1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. FOR INTERCONNECTIONS WITH OTHER ASSEMBLIES, SEE ASSOCIATED WIRING DIAGRAMS, FIGURES 6-2 AND 6-3.
3. FOR COMPLETE WIRING, SEE ALL VIEWS.
4. WIRES MARKED WITH COLOR NOTE ARE #24 SOLID COPPER, TEFLON INSULATION.
5. WIRES MARKED WITH COLOR NOTE AND AN ASTERISK (*) ARE #24 STRANDED COPPER, TEFLON INSULATION.
6. UNMARKED WIRES ARE #24 BARE, SOLID, TINNED COPPER.
7. ELECTRON TUBE V101 IS VIEWED TOWARD BASE ON LEFT VIEW. ORIENT TUBE IN CLIP AS SHOWN.
8. BARE TUBE LEADS ARE DRESSED WITH 1/16-INCH MINIMUM CLEARANCE.
9. FOR CLARITY, CERTAIN PARTS ARE DUPLICATED IN SOME VIEWS.
10. TEFLON TUBING OF .025-INCH I.D. IS INSTALLED OVER WIRE MARKED "T."

22242B

Figure 6–5. Megacycle Crystal Oscillator-Doubler, Wiring Diagram





IGURE 6-1.
HER ASSEMBLIES, SEE ASSOCIATED WIRING DIAGRAMS,

VIEWS. FOR CLARITY, CERTAIN PARTS ARE DUPLICATED

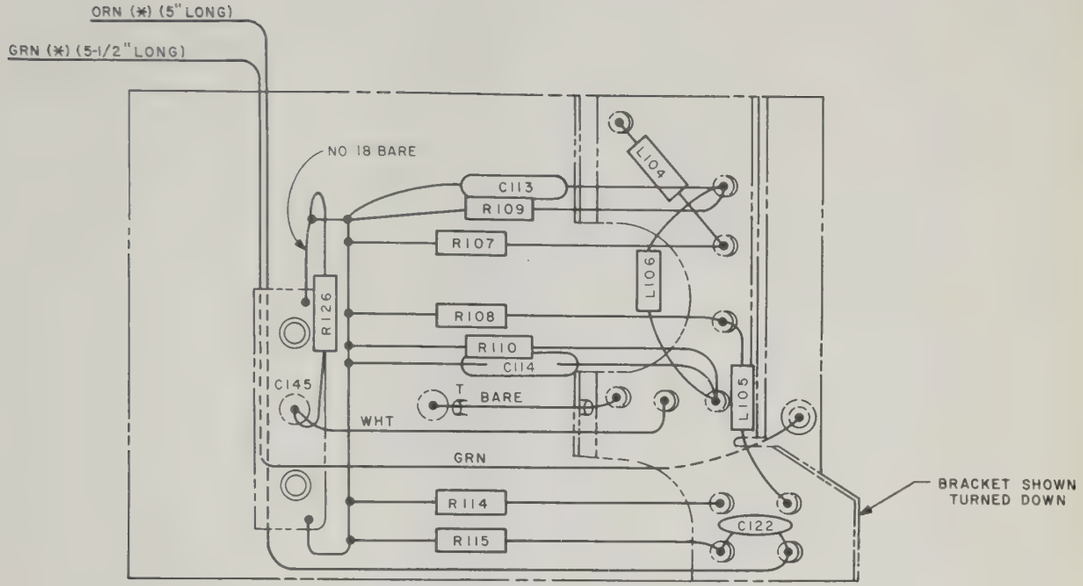
ARE #24 SOLID COPPER, TEFLON INSULATION.
AND AN ASTERISK (*) ARE #24 STRANDED COPPER,

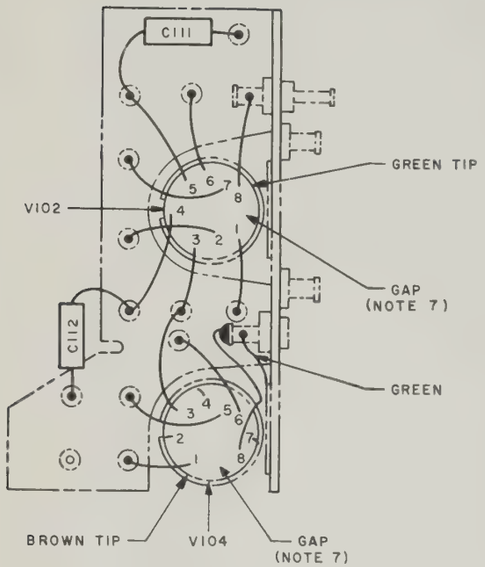
SOLID, TINNED COPPER, UNLESS OTHERWISE SPECIFIED.
ARE VIEWED TOWARD BASE IN END VIEW.
ON V104 ARE CUT OFF APPROXIMATELY 1/32 INCH

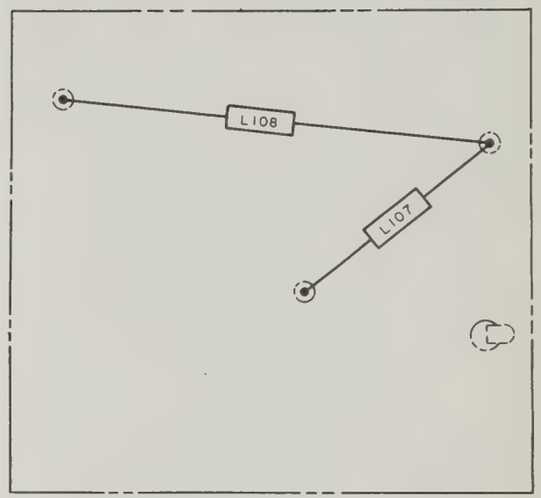
ITH TEFLON TUBING OF .025-INCH I.D.
WITH 1/16-INCH MINIMUM CLEARANCE.

22323B

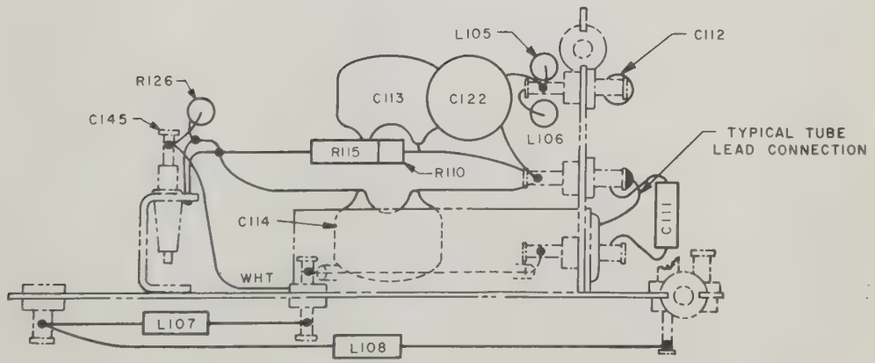
Figure 6–6. Fractional Megacycle Oscillator-Mixer and Tone Oscillator, Wiring Diagram







END VIEW

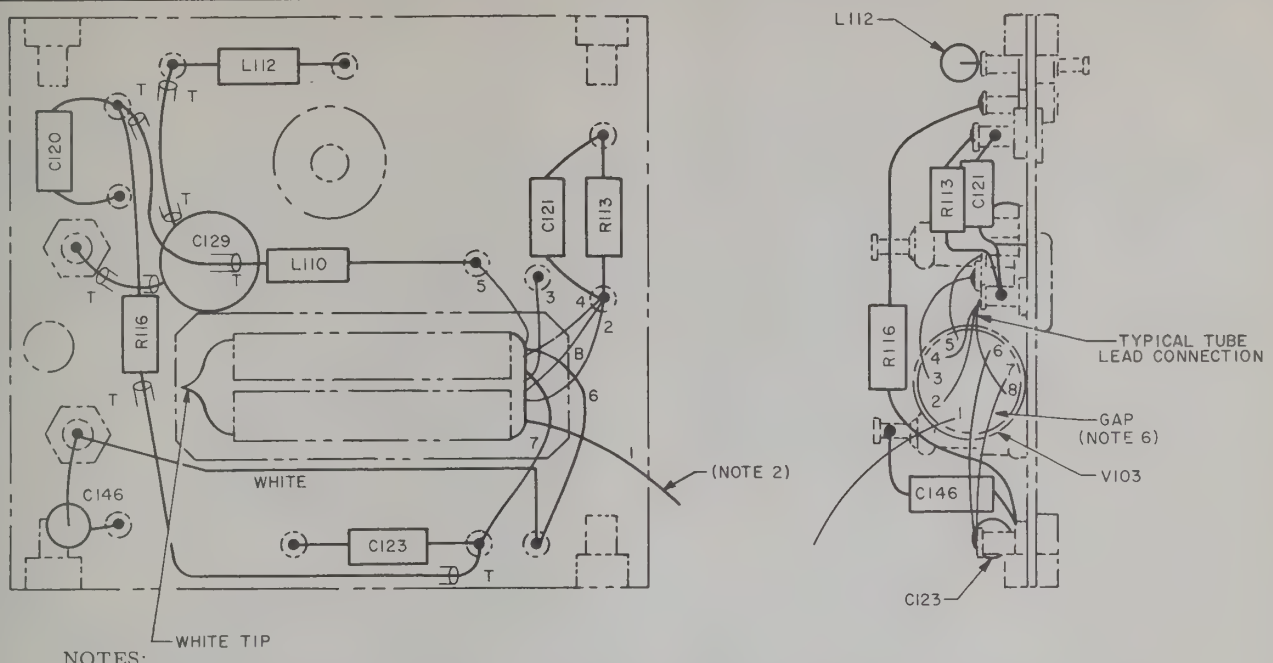


NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. FOR INTERCONNECTIONS WITH OTHER ASSEMBLIES, SEE ASSOCIATED WIRING DIAGRAMS, FIGURES 6-2 AND 6-3.
3. FOR COMPLETE WIRING, SEE ALL VIEWS. FOR CLARITY, CERTAIN PARTS ARE DUPLICATED IN SOME VIEWS.
4. WIRES MARKED WITH COLOR NOTE ARE #24 SOLID COPPER, TEFLON INSULATION.
5. WIRES MARKED WITH COLOR NOTE AND AN ASTERISK (*) ARE #24 STRANDED COPPER, TEFLON INSULATION.
6. UNMARKED WIRES ARE #24 BARE, SOLID, TINNED COPPER, UNLESS OTHERWISE SPECIFIED.
7. ELECTRON TUBES V102 AND V104 ARE VIEWED TOWARD BASE IN END VIEW.
8. UNUSED TUBE LEADS NO. 2, 4, & 7 ON V104 ARE CUT OFF APPROXIMATELY 1/32 INCH FROM GLASS.
9. WIRE MARKED "T" IS COVERED WITH TEFLON TUBING OF .025-INCH I. D.
10. BARE TUBE LEADS ARE DRESSED WITH 1/16-INCH MINIMUM CLEARANCE.

22323B

Figure 6–6. Fractional Megacycle Oscillator-Mixer and Tone Oscillator, Wiring Diagram

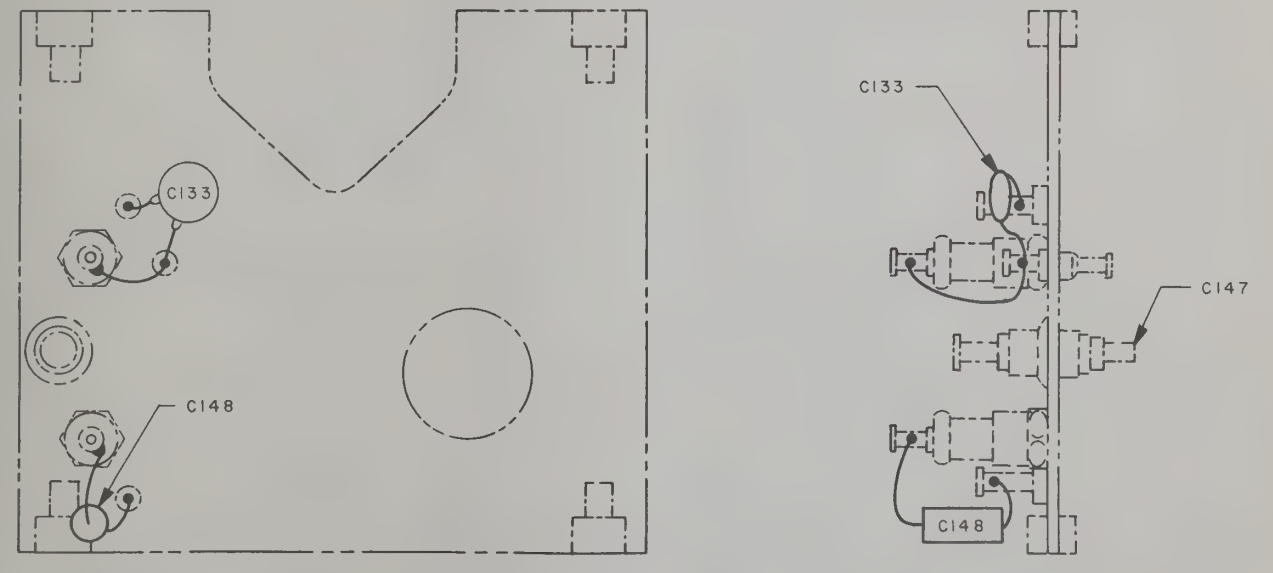


NOTES:

1. FOR ASSOCIATED SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. FOR INTERCONNECTIONS WITH OTHER ASSEMBLIES, SEE WIRING DIAGRAMS, FIGURES 6-2 AND 6-3.
3. FOR CLARITY, CERTAIN PARTS ARE IDENTIFIED IN BOTH VIEWS.
4. WIRES MARKED WITH COLOR NOTE ARE #24 SOLID COPPER, TEFLON INSULATION.
5. BARE TUBE LEADS ARE DRESSED WITH 1/16-INCH MINIMUM CLEARANCE.
6. ELECTRON TUBE V103 IS VIEWED TOWARD BASE IN END VIEW. ORIENT TUBE IN CLIP AS SHOWN.
7. TEFLON TUBING OF .025-INCH I.D. IS INSTALLED OVER WIRES MARKED "T."

22316B

Figure 6–7. R-f Amplifier, Wiring Diagram

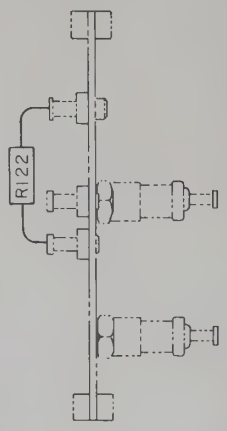


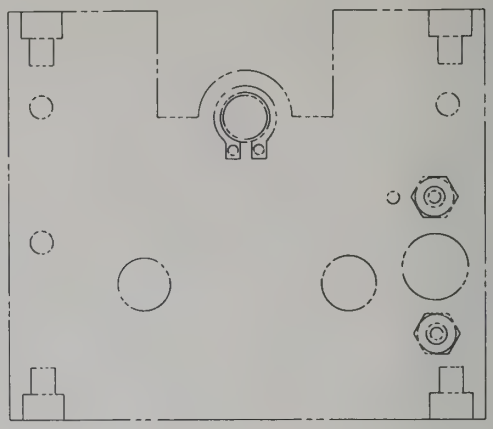
NOTES:

1. FOR ASSOCIATED SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. FOR INTERCONNECTIONS WITH OTHER ASSEMBLIES, SEE WIRING DIAGRAMS, FIGURES 6-2 AND 6-3.
3. FOR CLARITY, CERTAIN PARTS ARE IDENTIFIED IN BOTH VIEWS.
4. UNMARKED WIRES ARE #24 BARE, SOLID, TINNED COPPER.

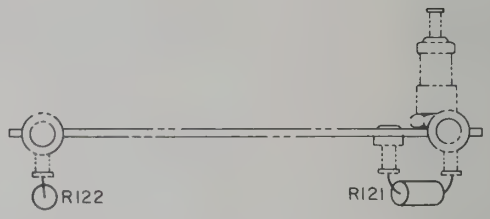
22319B

Figure 6–8. R-f Driver Amplifier, Wiring Diagram



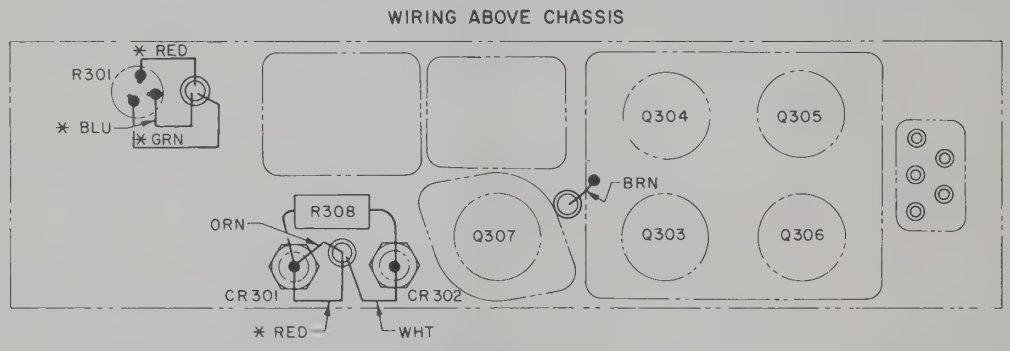


NOTES:
1. FOR ASSOCIATED SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. FOR INTERCONNECTIONS WITH OTHER ASSEMBLIES, SEE WIRING DIAGRAMS, FIGURES 6-2 AND 6-3.
3. FOR CLARITY, CERTAIN PARTS ARE DUPLICATED IN SOME VIEWS.



22318A

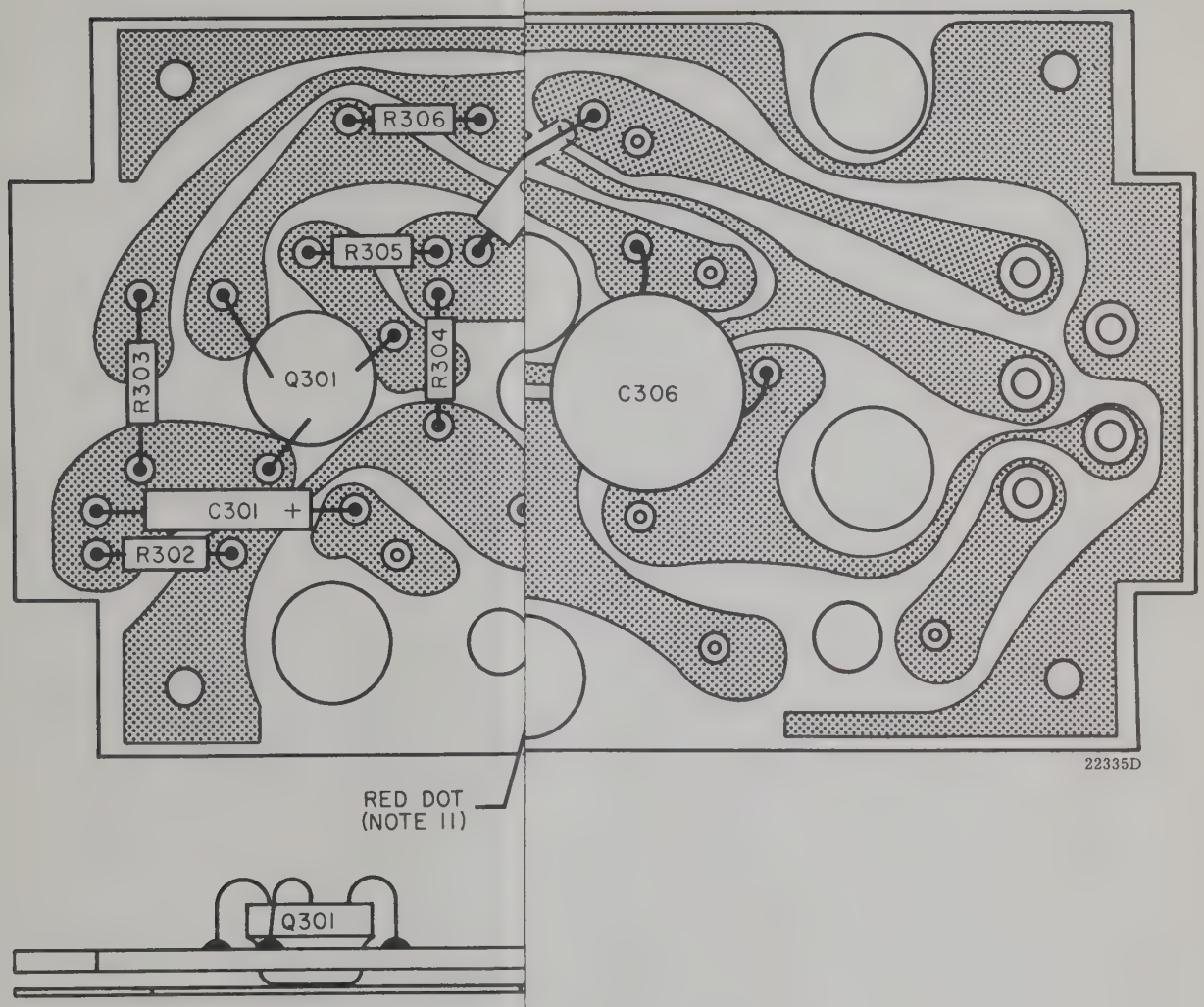
Figure 6–9. R-f Power Amplifier, Wiring Diagram



NOTES:
1. FOR ASSOCIATED SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. FOR INTERCONNECTIONS WITH OTHER ASSEMBLIES, SEE ASSOCIATED WIRING DIAGRAM, FIGURE 6-2.
3. FOR ADDITIONAL WIRING OF PRINTED-CIRCUIT ASSEMBLY, SEE ASSOCIATED WIRING DIAGRAM, FIGURE 6-11.
4. WIRES MARKED WITH COLOR NOTE ARE #22 STRANDED COPPER, TEFLON INSULATION.
5. WIRES MARKED WITH COLOR NOTE AND AN ASTERISK (*) ARE #24 STRANDED COPPER, TEFLON INSULATION.

22336C

Figure 6–10. Modulator Assembly, Wiring Diagram

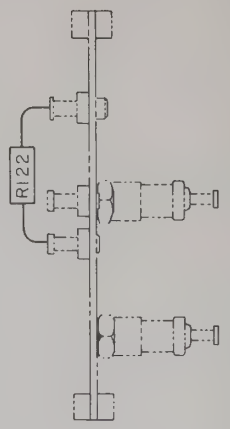


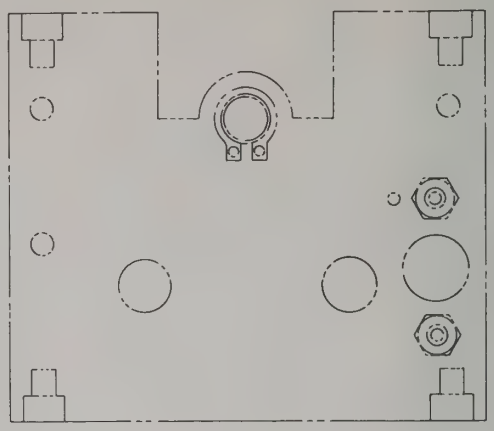
EMATIC DIAGRAM, SEE FIGURE 6-1.
ING DIAGRAM, SEE FIGURE 6-10.
AIN PARTS ARE IDENTIFIED IN BOTH VIEWS.
CITORS MUST NOT TOUCH MOUNTING SURFACE.
TE UNETCHED COPPER.
OT EXTEND MORE THAN 1/32-INCH BEYOND ENDS
TLINE OF LEADS MUST BE VISIBLE AFTER SOLDER-

025-INCH I.D. IS INSTALLED OVER CAPACITOR LEADS

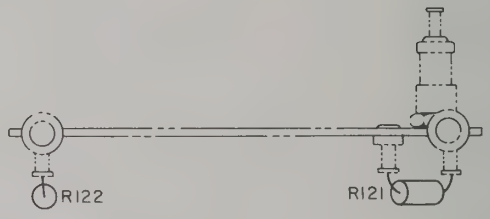
ANSISTORS Q301 AND Q302, USE A "HEAT SINK" SUCH
SOLDERING POINT AND CRYSTAL BODY.
MARKING ON CAPACITORS.
ITH BLACK GLYPTAL ENAMEL.
URNED UP FOR CLARITY.
ON T301 AND T302 ARE SHOWN FOR REFERENCE

Figure 6–11. Modulator Printed-circuit Assembly, Wiring Diagram



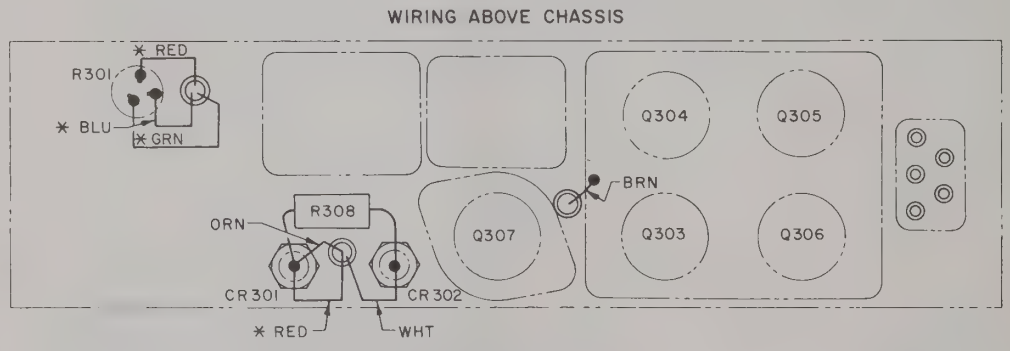


NOTES:
1. FOR ASSOCIATED SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. FOR INTERCONNECTIONS WITH OTHER ASSEMBLIES, SEE WIRING DIAGRAMS, FIGURES 6-2 AND 6-3.
3. FOR CLARITY, CERTAIN PARTS ARE DUPLICATED IN SOME VIEWS.



22318A

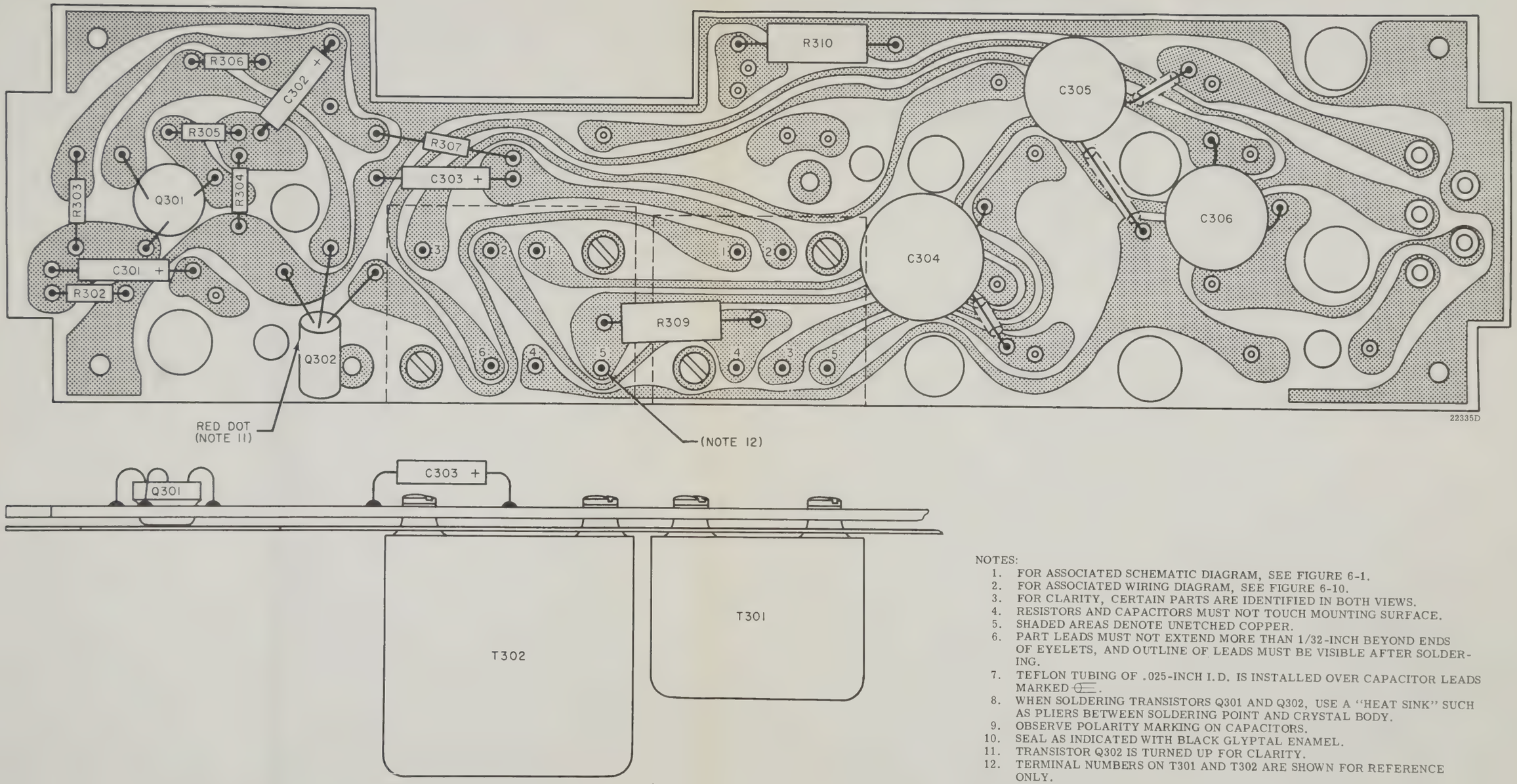
Figure 6–9. R-f Power Amplifier, Wiring Diagram



NOTES:
1. FOR ASSOCIATED SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. FOR INTERCONNECTIONS WITH OTHER ASSEMBLIES, SEE ASSOCIATED WIRING DIAGRAM, FIGURE 6-2.
3. FOR ADDITIONAL WIRING OF PRINTED-CIRCUIT ASSEMBLY, SEE ASSOCIATED WIRING DIAGRAM, FIGURE 6-11.
4. WIRES MARKED WITH COLOR NOTE ARE #22 STRANDED COPPER, TEFLON INSULATION.
5. WIRES MARKED WITH COLOR NOTE AND AN ASTERISK (*) ARE #24 STRANDED COPPER, TEFLON INSULATION.

22336C

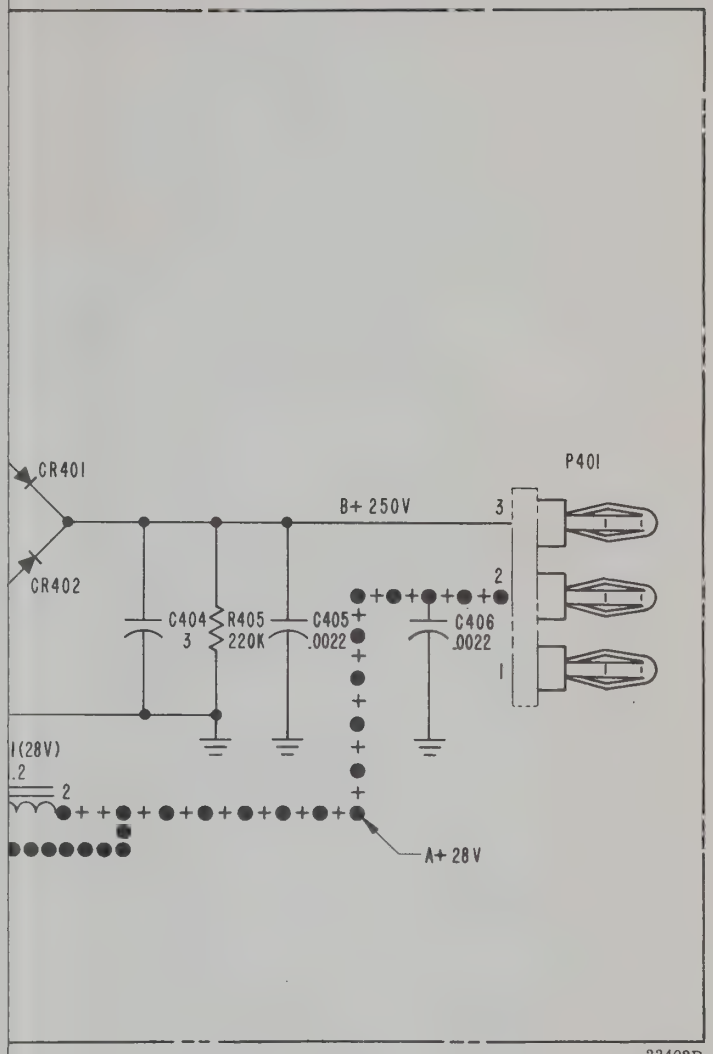
Figure 6–10. Modulator Assembly, Wiring Diagram



NOTES:

1. FOR ASSOCIATED SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
2. FOR ASSOCIATED WIRING DIAGRAM, SEE FIGURE 6-10.
3. FOR CLARITY, CERTAIN PARTS ARE IDENTIFIED IN BOTH VIEWS.
4. RESISTORS AND CAPACITORS MUST NOT TOUCH MOUNTING SURFACE.
5. SHADED AREAS DENOTE UNETCHED COPPER.
6. PART LEADS MUST NOT EXTEND MORE THAN 1/32-INCH BEYOND ENDS OF EYELETS, AND OUTLINE OF LEADS MUST BE VISIBLE AFTER SOLDERING.
7. TEFLON TUBING OF .025-INCH I.D. IS INSTALLED OVER CAPACITOR LEADS MARKED ⊖.
8. WHEN SOLDERING TRANSISTORS Q301 AND Q302, USE A "HEAT SINK" SUCH AS PLIERS BETWEEN SOLDERING POINT AND CRYSTAL BODY.
9. OBSERVE POLARITY MARKING ON CAPACITORS.
10. SEAL AS INDICATED WITH BLACK GLYPTAL ENAMEL.
11. TRANSISTOR Q302 IS TURNED UP FOR CLARITY.
12. TERMINAL NUMBERS ON T301 AND T302 ARE SHOWN FOR REFERENCE ONLY.

Figure 6–11. Modulator Printed-circuit Assembly, Wiring Diagram



).

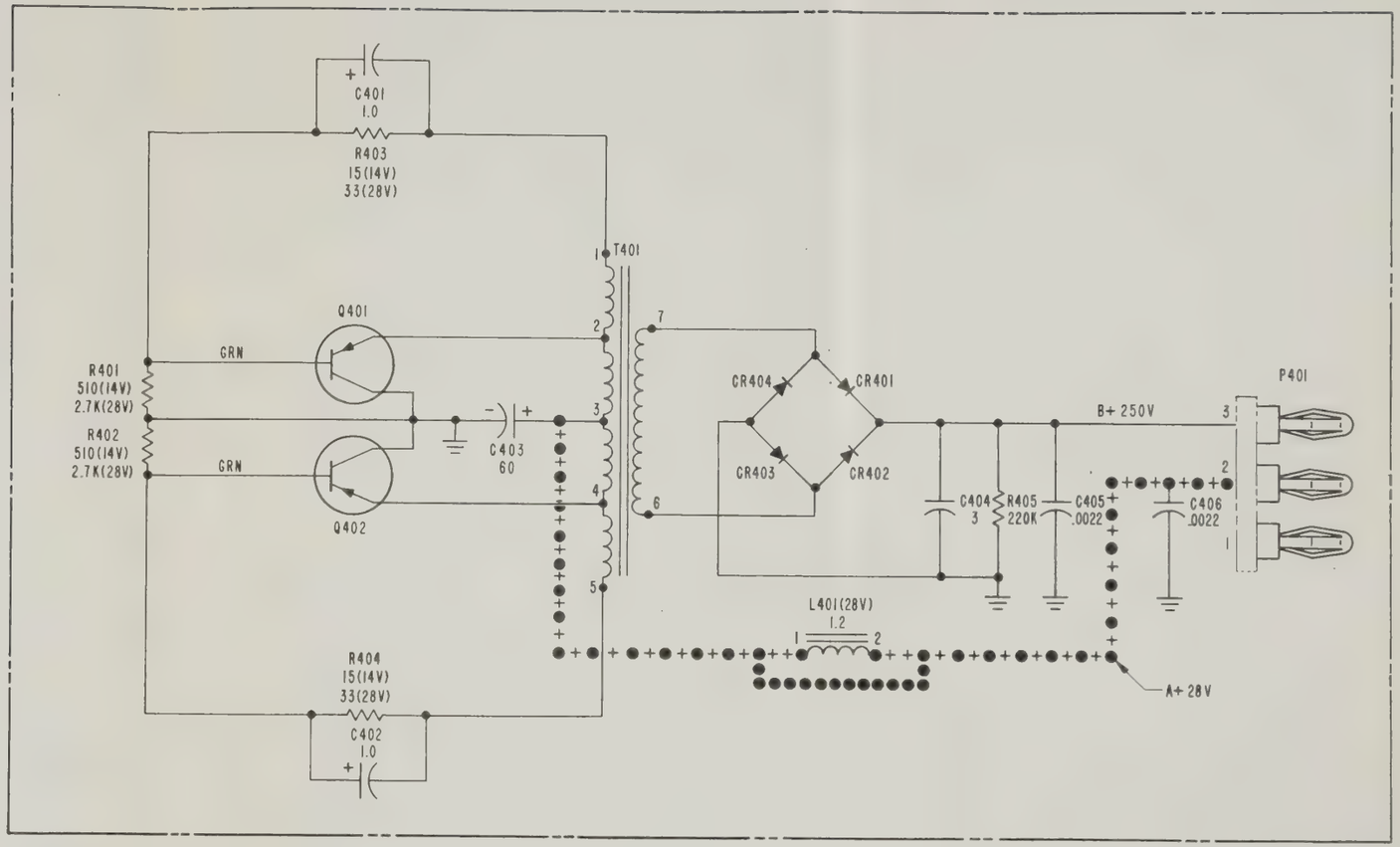
K=1,000.

NNECTED AND WIRES MARKED

CONNECTED AND WIRE MARKED

Figure 6–12. DV-12A Dynaverter, Schematic Diagram

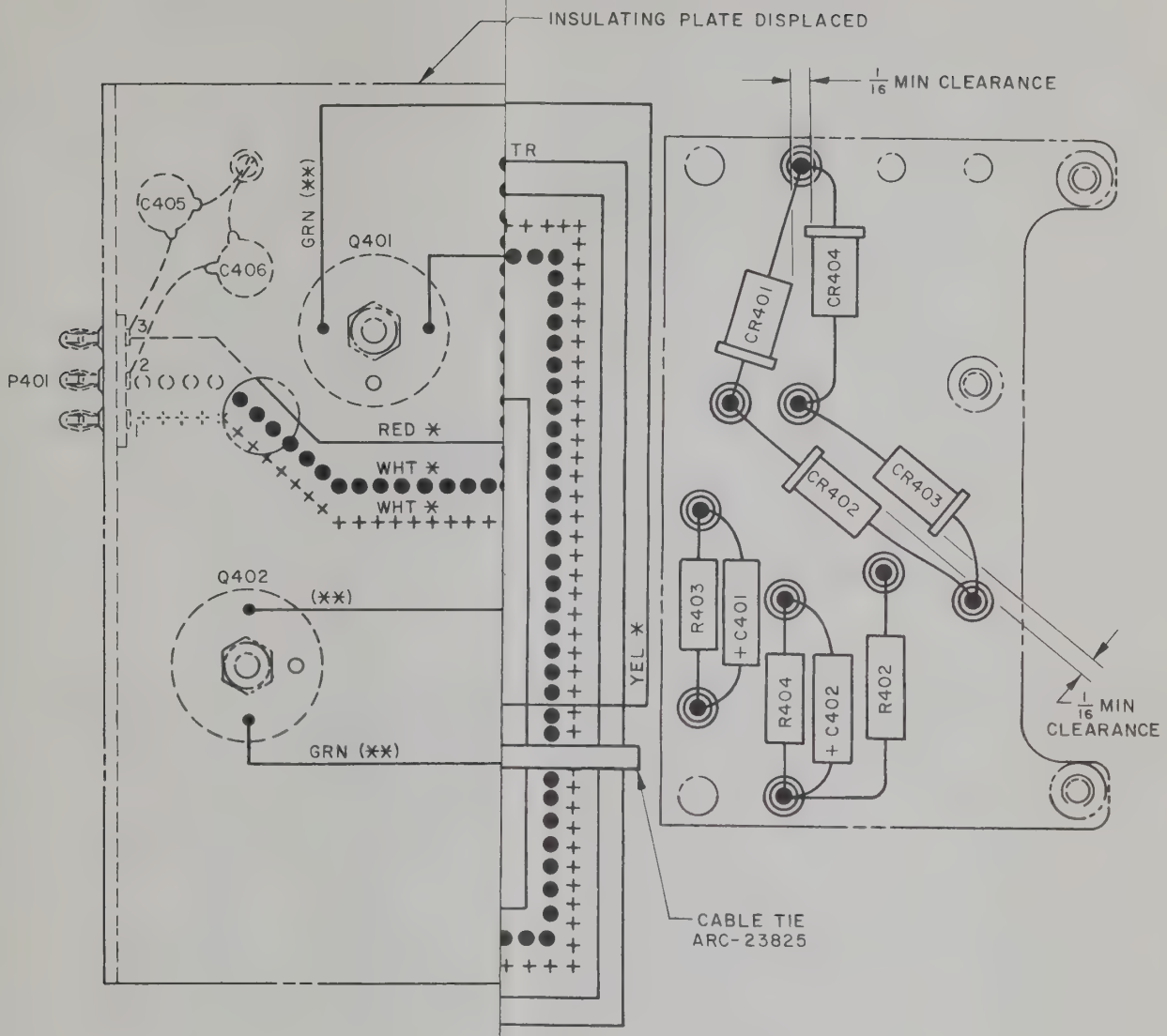
Ref Desig	ARC Part No.
C401	21485-9101
C402	21485-9101
C403	23943
C404	7582
CR401	20474
CR402	20474
CR403	20474
CR404	20474
L401	21429
P401	p/o 23540
Q401	20454
Q401	21153
Q402	20454
Q402	21153
R401	202-0272
R401	202-0511
R402	202-0272
R402	202-0511
R403	201-0330
R403	201-0150
R404	201-0330
R404	201-0150
R405	201-0224
T401	20424
T401	21155



NOTES:

1. FOR WIRING DIAGRAM, SEE FIGURE 6-13.
2. CAPACITANCE VALUES ARE IN MICROFARADS (μF).
3. RESISTANCE VALUES ARE IN OHMS. MULTIPLIER K=1,000.
4. INDUCTANCE VALUE IS IN MILLIHENRIES (MH).
5. FOR 14-VOLT UNIT, WIRE MARKED (. . . .) IS CONNECTED AND WIRES MARKED (+ + + +) ARE OMITTED.
6. FOR 28-VOLT UNIT, WIRES MARKED (+ + + +) ARE CONNECTED AND WIRE MARKED (. . . .) IS OMITTED.

Figure 6–12. DV-12A Dynaverter, Schematic Diagram

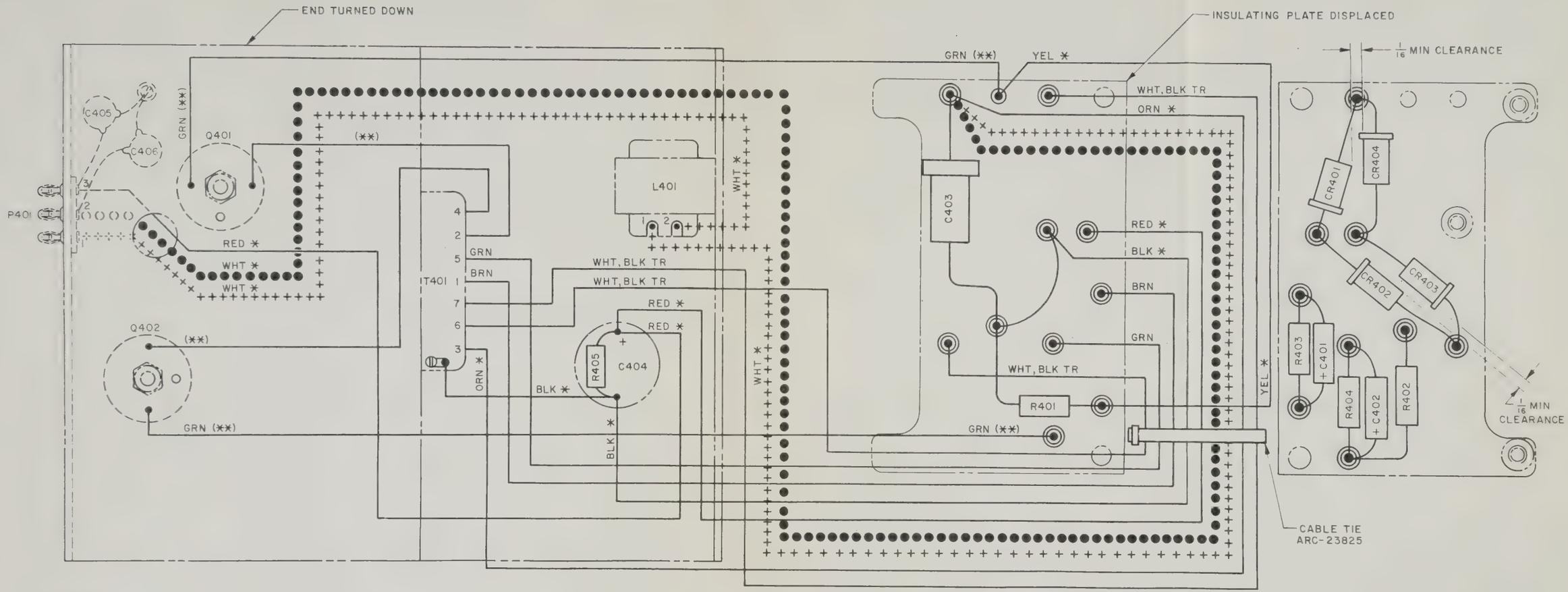


NOTES:

1. FOR SCHEMATIC DIAGRAM, SE
2. WIRES MARKED WITH COLOR N SULATION.
3. WIRES MARKED WITH COLOR N COPPER, TEFLON INSULATION
4. UNMARKED WIRE IS #24 BARE,
5. WIRES MARKED WITH A DOUBL THOSE WITHOUT COLOR NOTE
6. FOR 14-VOLT UNIT, WIRE MAR (+ + + +) ARE OMITTED.
7. FOR 28-VOLT UNIT, WIRES MA (. . . .) IS OMITTED.

23401B

Figure 6–13. DV-12A Dynaverter, Wiring Diagram



NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-12.
2. WIRES MARKED WITH COLOR NOTE ARE #24 STRANDED COPPER, TEFLON INSULATION.
3. WIRES MARKED WITH COLOR NOTE AND AN ASTERISK (*) ARE #22 STRANDED COPPER, TEFLON INSULATION
4. UNMARKED WIRE IS #24 BARE, SOLID, TINNED COPPER.
5. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE FURNISHED WITH TRANSISTORS. THOSE WITHOUT COLOR NOTE VARY IN COLOR.
6. FOR 14-VOLT UNIT, WIRE MARKED (. . . .) IS CONNECTED AND WIRES MARKED (+ + + +) ARE OMITTED.
7. FOR 28-VOLT UNIT, WIRES MARKED (+ + + +) ARE CONNECTED AND WIRE MARKED (. . . .) IS OMITTED.

23401B

Figure 6–13. DV-12A Dynaverter, Wiring Diagram

NOTES:

1. FOR WIRING DIAGRAM, SE

2. SWITCH SECTIONS S201A A
IDENTIFICATION OF SWIT

3. S201A CONTROLS TERMIN
N, O, P, Q, R. AT EACH PO
EACH GROUP ARE GROUN
CONNECTED TOGETHER

4. TERMINALS H, I, J, K & L A
SWITCH. SEE TABLE 1.

TABLE 1. TABULATI

S201A	SCS OPERATION GROUP A, B, C, D, E (Note 3)
118	C, E
119	A, D
120	A, B, E
121	B, C
122	C, D
123	D, E
124	E
125	A
126	B
127	C
128	D
129	A, E
130	A, B
131	A, B, C
132	A, B, C, D
133	B, C, D, E
134	A, C, D, E
135	B, D, E

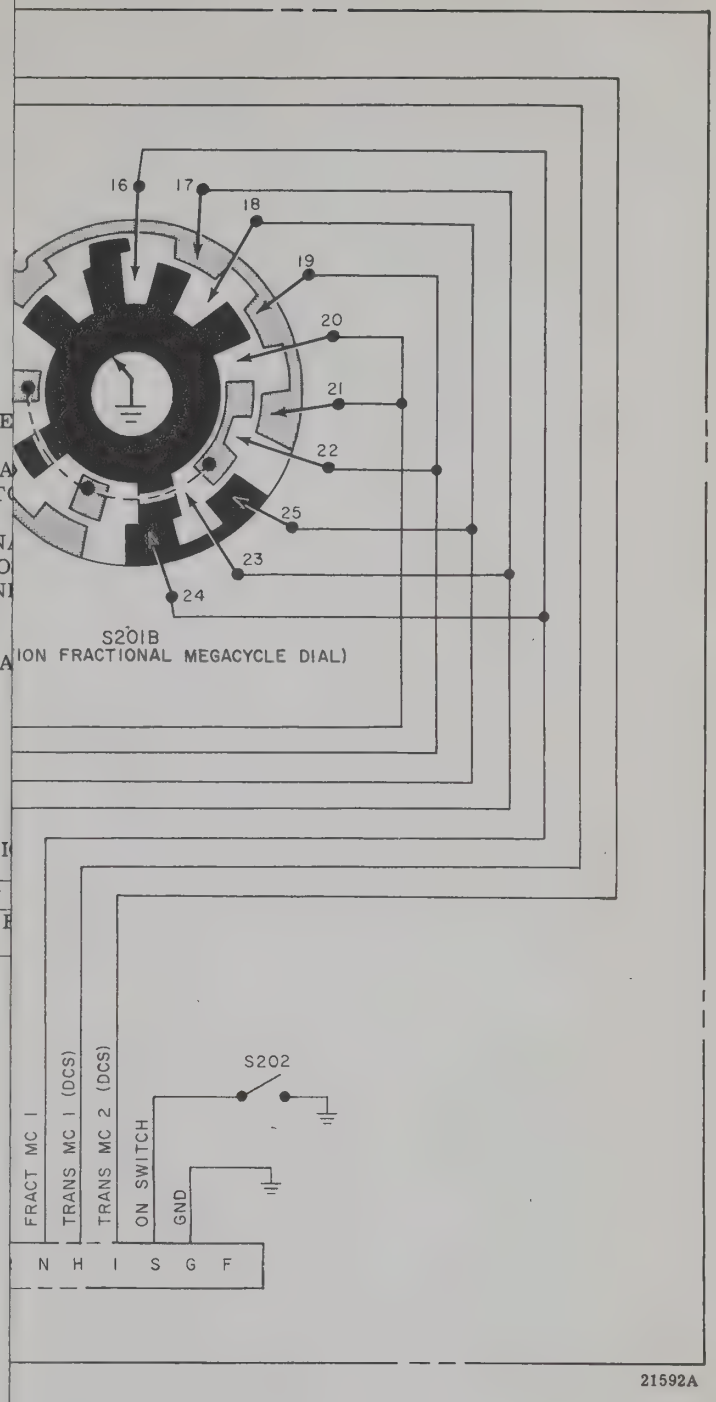


Figure 6–14. C-82A Control Unit, Schematic Diagram

NOTES:

1. FOR WIRING DIAGRAM, SEE FIGURE 6-15.
2. SWITCH SECTIONS S201A AND S201B ARE SHOWN IN 118.00-MC POSITION. FOR IDENTIFICATION OF SWITCH TERMINALS, SEE FIGURE 6-15.
3. S201A CONTROLS TERMINAL GROUP A, B, C, D, E of J201; S201B CONTROLS GROUP N, O, P, Q, R. AT EACH POSITION OF S201A AND S201B, CERTAIN TERMINALS IN EACH GROUP ARE GROUNDED AND THE OTHER TERMINALS OF THE GROUP ARE CONNECTED TOGETHER FREE OF GROUND. SEE TABLE 1.
4. TERMINALS H, I, J, K & L ARE FOR "DCS" OPERATION FROM AN EXTERNAL SWITCH. SEE TABLE 1.

TABLE 1. TABULATION OF GROUNDED TERMINALS IN EACH GROUP

S201A	SCS OPERATION GROUP A, B, C, D, E (Note 3)	DCS OPERATION GROUP H, I, J, K, L (Note 4)	S201B	GROUP N, O, P, Q, R (Note 3)
118	C, E	L	.00	N, O
119	A, D	H	.05	N, O, P
120	A, B, E	I	.10	N, R
121	B, C	J	.15	N, O, P, Q
122	C, D	K	.20	Q
123	D, E	H, L	.25	O, P, Q, R
124	E	H, I	.30	P
125	A	H, I, J	.35	N, P, Q, R
126	B	H, I, J, K	.40	O
127	C	I, J, K, L	.45	O, Q, R
128	D	H, J, K, L	.50	N
129	A, E	I, K, L	.55	N, P, R
130	A, B	J, L	.60	R
131	A, B, C	H, K	.65	O, Q
132	A, B, C, D	H, I, L	.70	Q, R
133	B, C, D, E	I, J	.75	P, R
134	A, C, D, E	J, K	.80	P, Q
135	B, D, E	K, L	.85	N, Q
			.90	O, P
			.95	N, O, R

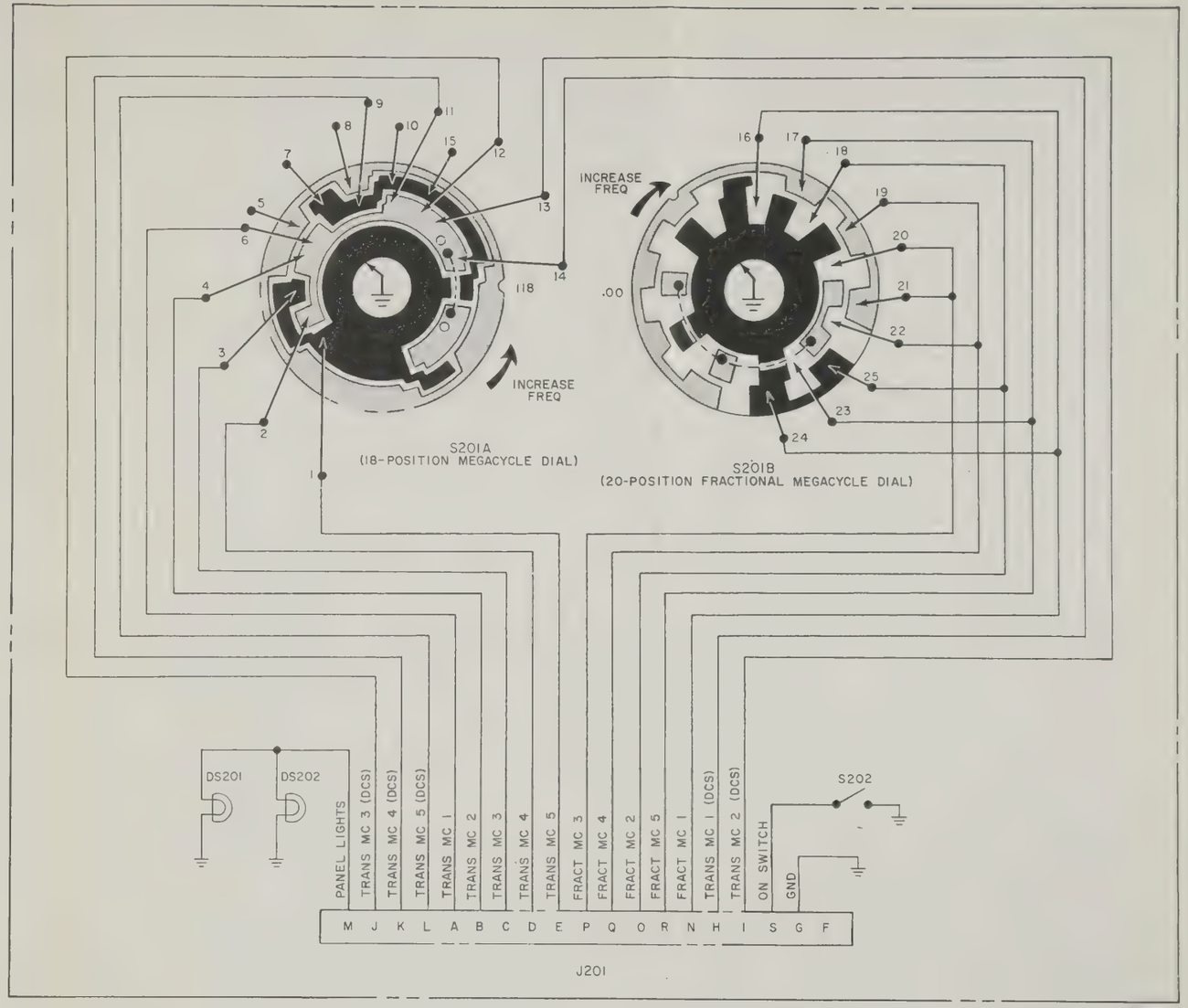
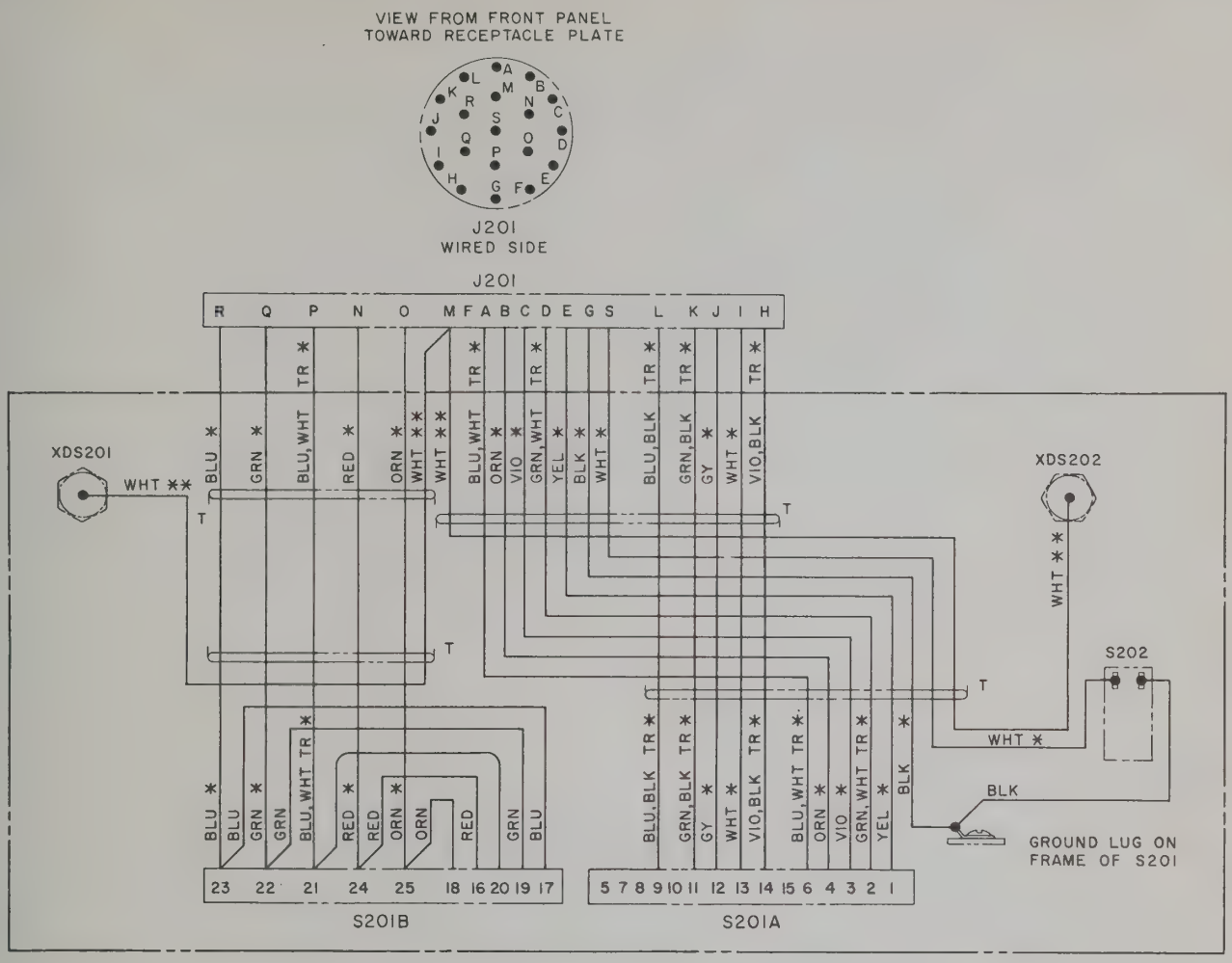
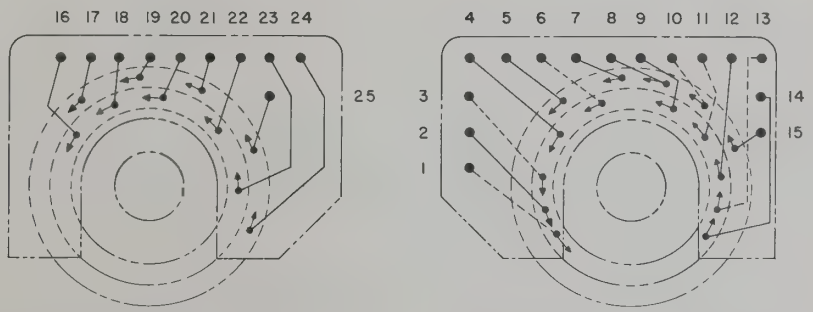


Figure 6–14. C-82A Control Unit, Schematic Diagram





S201B
CHANNEL SELECTOR SWITCH
(LEFT SIDE WHEN VIEWED FROM REAR)

S201A
CHANNEL SELECTOR SWITCH
(LEFT SIDE WHEN VIEWED FROM REAR)

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-14.
2. WIRES MARKED WITH COLOR NOTE ARE #24 SOLID COPPER, TEFLON INSULATION.
3. WIRES MARKED BY COLOR NOTE AND AN ASTERISK (*) ARE #22 STRANDED COPPER, TEFLON INSULATION.
4. WIRES MARKED BY COLOR NOTE AND A DOUBLE ASTERISK (**) ARE #20 STRANDED COPPER, TEFLON INSULATION.
5. UNMARKED WIRE IS #24 BARE, SOLID, TINNED COPPER.
6. WIRES OR GROUPS OF WIRES MARKED "T" ARE COVERED WITH TRANSPARENT VINYLITE TUBING OF APPROPRIATE SIZE.

21591A

Figure 6–15. C-82A Control Unit, Wiring Diagram

Switch Position (MC)	MC Cycling-SCS J201 Terminal					MC Cycling-DCS J201 Terminal				
	A	B	C	D	E	H	I	J	K	L
118	†	†	*	†	*	(†)	(†)	(†)	(†)	(*)
119	*	†	†	*	†	(*)	(†)	(†)	(†)	(†)
120	*	*	†	†	*	(†)	(*)	(†)	(†)	(†)
121	†	*	*	†	†	(†)	(†)	(*)	(†)	(†)
122	†	†	*	*	†	(†)	(†)	(†)	(*)	(†)
123	†	†	†	*	*	(*)	(†)	(†)	(†)	(*)
124	†	†	†	†	*	(*)	(*)	(†)	(†)	(†)
125	*	†	†	†	†	(*)	(*)	(*)	(†)	(†)
126	†	*	†	†	†	(*)	(*)	(*)	(*)	(†)
127	†	†	*	†	†	(†)	(*)	(*)	(*)	(*)
128	†	†	†	*	†	(*)	(†)	(*)	(*)	(*)
129	*	†	†	†	*	(†)	(*)	(†)	(*)	(*)
130	*	*	†	†	†	(†)	(†)	(*)	(†)	(*)
131	*	*	*	†	†	(*)	(†)	(†)	(*)	(†)
132	*	*	*	*	†	(*)	(*)	(†)	(†)	(*)
133	†	*	*	*	*	(†)	(*)	(*)	(†)	(†)
134	*	†	*	*	*	(†)	(†)	(*)	(*)	(†)
135	†	*	†	*	*	(†)	(†)	(†)	(*)	(*)

Switch Position (MC)	Fractional MC Cycling J201 Terminal				
	N	O	P	Q	R
.00	*	*	†	†	†
.05	*	*	*	†	†
.10	*	†	†	†	*
.15	*	*	*	*	†
.20	†	†	†	*	†
.25	†	*	*	*	*
.30	†	†	*	†	†
.35	*	†	*	*	*
.40	†	*	†	†	†
.45	†	*	†	*	*
.50	*	†	†	†	†
.55	*	†	*	†	*
.60	†	†	†	†	*
.65	†	*	†	*	†
.70	†	†	†	*	*
.75	†	†	*	†	*
.80	†	†	*	*	†
.85	*	†	†	*	†
.90	†	*	*	†	†
.95	*	*	†	†	*

NOTES:

1. TO CHECK CONTINUITY OF ANY OF THE CHANNEL SELECTOR SWITCH POSITIONS LISTED IN THE TABLE, USE A VOLT-OHMMETER (SIMPSON MODEL 260, OR EQUIVALENT) AND SET THE RANGE SWITCH TO THE R X 1 SCALE SO THAT POSITIVE CONTACT CAN BE DETERMINED. CONNECT ONE LEAD TO GROUND, TERMINAL G OF J201, AND CONNECT THE OTHER LEAD TO EACH OF THE TERMINALS INDICATED. THE CORRECT CONTINUITY FOR THE SWITCH POSITION BEING CHECKED IS GIVEN BY THE FOLLOWING CODE IN WHICH TERMINAL LEADS HAVING THE SAME SYMBOL ARE CONNECTED TO EACH OTHER:

   * = GROUNDED TERMINAL

   † = UNGROUNDED TERMINAL AND CONNECTED TO OTHER TERMINALS MARKED †

2. AFTER CHECKING THE CONTINUITY OF EACH TERMINAL TO GROUND, REMOVE THE TEST LEAD FROM GROUND AND CONNECT IT TO ONE OF THE TERMINALS MARKED (†). THEN CHECK CONTINUITY WITH ALL OTHER TERMINALS MARKED (†) TO INSURE THAT THEY ARE CONNECTED TOGETHER. FOR EXAMPLE: ASSUMING DCS OPERATION AND THE MEGACYCLE CHANNEL SELECTOR SWITCH SET AT 124 MC, CORRECT CONTINUITY FOR THIS SWITCH POSITION WOULD BE:

TERMINAL OF J201	CORRECT CONTINUITY
H	(*) = GROUNDED
I	(*) = GROUNDED
J	(†) = UNGROUNDED, CONNECTED TO TERMINALS K AND L
K	(†) = UNGROUNDED, CONNECTED TO TERMINALS J AND L
L	(†) = UNGROUNDED, CONNECTED TO TERMINALS J AND K

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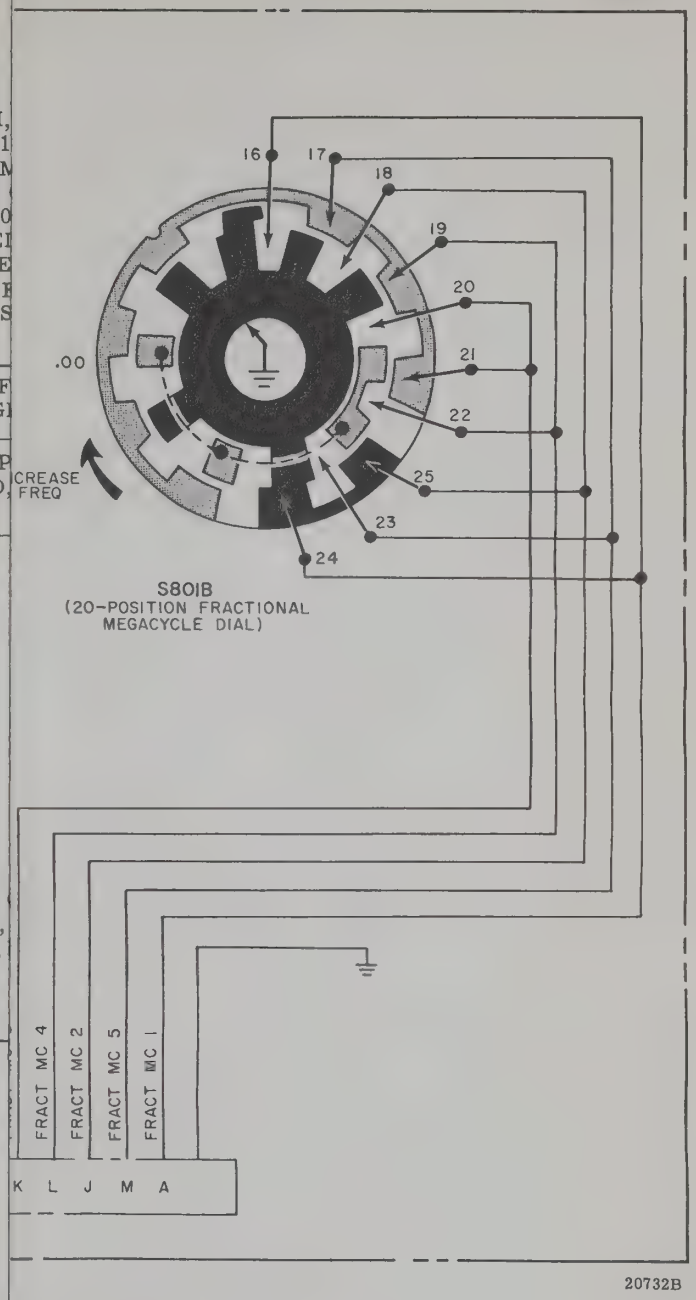
Figure 6–16. C-82A Control Unit, Continuity Sequence Table

NOTES:

1. FOR WIRING DIAGRAM,
2. SWITCH SECTIONS S801
3. S801A CONTROLS TERM
   C, D, E, F, H. S801B
   EACH POSITION OF S80
   GROUP ARE GROUNDE
   CONNECTED TOGETHE
4. TERMINALS C, D, E,
   EXTERNAL SWITCH. S

TABULATION OF IN EACH G		
S801A	GROUP B, G, U, T, R	GROUP S, Q, P, O, (SCS)
118	B, G, T	P, N
119	B, G, U, R	S, O
120	B, G, U, T	S, Q, N
121	G, U, T, R	Q, P
122	U, T, R	P, O
123	T, R	O, N
124	B, R	N
125	G	S
126	U	Q
127	T	P
128	R	O
129	B	S, N
130	B, G	S, Q
131	G, U	S, Q, P
132	U, T	S, Q, P,
133	B, T, R	Q, P, O,
134	G, R	S, P, O,
135	B, U	Q, O, N



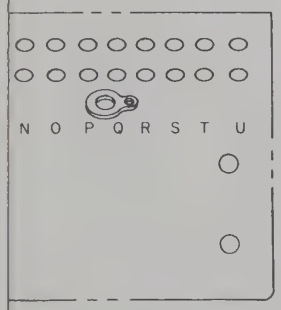


Figure 6–17. Channel Selector Switch ARC-20730, Schematic Diagram

Switch Position (MC)	MC Cycling-SCS J201 Terminal					MC Cycling-DCS J201 Terminal				
	A	B	C	D	E	H	I	J	K	L
118	†	†	*	†	*	(†)	(†)	(†)	(†)	(*)
119	*	†	†	*	†	(*)	(†)	(†)	(†)	(†)
120	*	*	†	†	*	(†)	(*)	(†)	(†)	(†)
121	†	*	*	†	†	(†)	(†)	(*)	(†)	(†)
122	†	†	*	*	†	(†)	(†)	(†)	(*)	(†)
123	†	†	†	*	*	(*)	(†)	(†)	(†)	(*)
124	†	†	†	†	*	(*)	(*)	(†)	(†)	(†)
125	*	†	†	†	†	(*)	(*)	(*)	(†)	(†)
126	†	*	†	†	†	(*)	(*)	(*)	(*)	(†)
127	†	†	*	†	†	(†)	(*)	(*)	(*)	(*)
128	†	†	†	*	†	(*)	(†)	(*)	(*)	(*)
129	*	†	†	†	*	(†)	(*)	(†)	(*)	(*)
130	*	*	†	†	†	(†)	(†)	(*)	(†)	(*)
131	*	*	*	†	†	(*)	(†)	(†)	(*)	(†)
132	*	*	*	*	†	(*)	(*)	(†)	(†)	(*)
133	†	*	*	*	*	(†)	(*)	(*)	(†)	(†)
134	*	†	*	*	*	(†)	(†)	(*)	(*)	(†)
135	†	*	†	*	*	(†)	(†)	(†)	(*)	(*)

Switch Position (MC)	Fractional MC Cycling J201 Terminal				
	N	O	P	Q	R
.00	*	*	†	†	†
.05	*	*	*	†	†
.10	*	†	†	†	*
.15	*	*	*	*	†
.20	†	†	†	*	†
.25	†	*	*	*	*
.30	†	†	*	†	†
.35	*	†	*	*	*
.40	†	*	†	†	†
.45	†	*	†	*	*
.50	*	†	†	†	†
.55	*	†	*	†	*
.60	†	†	†	†	*
.65	†	*	†	*	†
.70	†	†	†	*	*
.75	†	†	*	†	*
.80	†	†	*	*	†
.85	*	†	†	*	†
.90	†	*	*	†	†
.95	*	*	†	†	*

NOTES:

1. TO CHECK CONTINUITY OF ANY OF THE CHANNEL SELECTOR SWITCH POSITIONS LISTED IN THE TABLE, USE A VOLT-OHMMETER (SIMPSON MODEL 260, OR EQUIVALENT) AND SET THE RANGE SWITCH TO THE R X 1 SCALE SO THAT POSITIVE CONTACT CAN BE DETERMINED. CONNECT ONE LEAD TO GROUND, TERMINAL G OF J201, AND CONNECT THE OTHER LEAD TO EACH OF THE TERMINALS INDICATED. THE CORRECT CONTINUITY FOR THE SWITCH POSITION BEING CHECKED IS GIVEN BY THE FOLLOWING CODE IN WHICH TERMINAL LEADS HAVING THE SAME SYMBOL ARE CONNECTED TO EACH OTHER:

   * = GROUNDED TERMINAL

   † = UNGROUNDED TERMINAL AND CONNECTED TO OTHER TERMINALS MARKED †

2. AFTER CHECKING THE CONTINUITY OF EACH TERMINAL TO GROUND, REMOVE THE TEST LEAD FROM GROUND AND CONNECT IT TO ONE OF THE TERMINALS MARKED (†). THEN CHECK CONTINUITY WITH ALL OTHER TERMINALS MARKED (†) TO INSURE THAT THEY ARE CONNECTED TOGETHER. FOR EXAMPLE: ASSUMING DCS OPERATION AND THE MEGACYCLE CHANNEL SELECTOR SWITCH SET AT 124 MC, CORRECT CONTINUITY FOR THIS SWITCH POSITION WOULD BE:

TERMINAL OF J201	CORRECT CONTINUITY
H	(*) = GROUNDED
I	(*) = GROUNDED
J	(†) = UNGROUNDED, CONNECTED TO TERMINALS K AND L
K	(†) = UNGROUNDED, CONNECTED TO TERMINALS J AND L
L	(†) = UNGROUNDED, CONNECTED TO TERMINALS J AND K

TP1777

Figure 6–16. C-82A Control Unit, Continuity Sequence Table

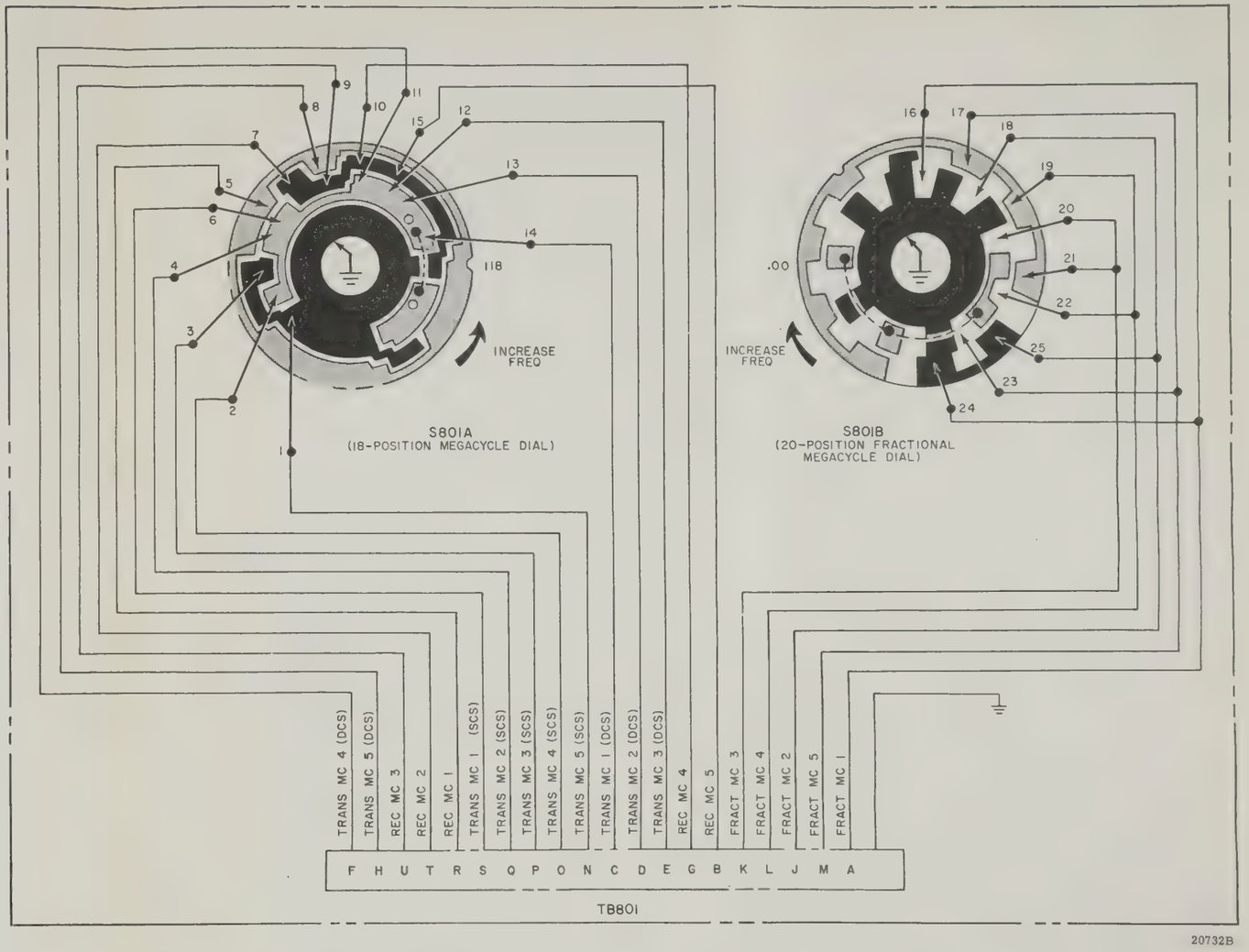
NOTES:
1. FOR WIRING DIAGRAM, SEE FIGURE 6-18.
2. SWITCH SECTIONS S801A AND S801B ARE SHOWN IN 118.00-MC POSITION.
3. S801A CONTROLS TERMINAL GROUPS B, G, U, T, R; S, Q, P, O, N; AND C, D, E, F, H. S801B CONTROLS TERMINAL GROUP A, J, K, L, M. AT EACH POSITION OF S801A AND S801B, CERTAIN TERMINALS IN EACH GROUP ARE GROUNDED AND THE OTHER TERMINALS OF THE GROUP ARE CONNECTED TOGETHER FREE OF GROUND.
4. TERMINALS C, D, E, F, AND H ARE FOR "DCS" OPERATION FROM AN EXTERNAL SWITCH. SEE TABLE AND FIGURE 2-16.

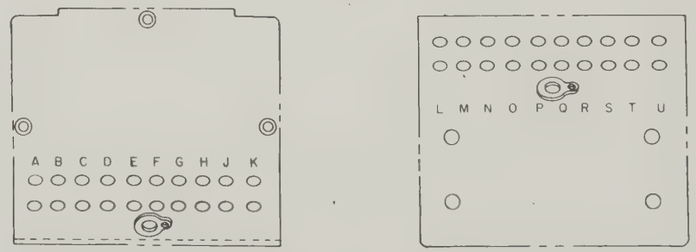
TABULATION OF GROUNDED TERMINALS IN EACH GROUP (NOTES 3 & 4)

S801A	GROUP B, G, U, T, R	GROUP S, Q, P, O, N (SCS)	GROUP C, D, E, F, H (DCS)	S801B	GROUP A, J, K, L, M
118	B, G, T	P, N	H	.00	A, J
119	B, G, U, R	S, O	C	.05	A, J, K
120	B, G, U, T	S, Q, N	D	.10	A, M
121	G, U, T, R	Q, P	E	.15	A, J, K, L
122	U, T, R	P, O	F	.20	L
123	T, R	O, N	C, H	.25	J, K, L, M
124	B, R	N	C, D	.30	K
125	G	S	C, D, E	.35	A, K, L, M
126	U	Q	C, D, E, F	.40	J
127	T	P	D, E, F, H	.45	J, L, M
128	R	O	C, E, F, H	.50	A
129	B	S, N	D, F, H	.55	A, K, M
130	B, G	S, Q	E, H	.60	M
131	G, U	S, Q, P	C, F	.65	J, L
132	U, T	S, Q, P, O	C, D, H	.70	L, M
133	B, T, R	Q, P, O, N	D, E	.75	K, M
134	G, R	S, P, O, N	E, F	.80	K, L
135	B, U	Q, O, N	F, H	.85	A, L
				.90	J, K
				.95	A, J, M

CONNECTED TO GROUND

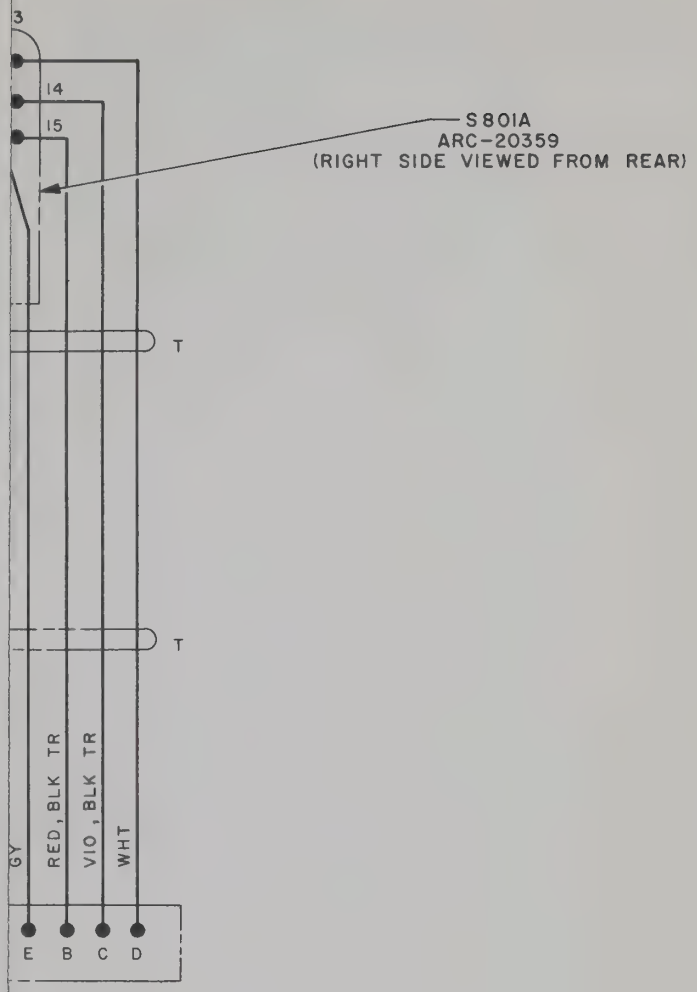
INSULATED FROM GROUND AND CONNECTED TOGETHER





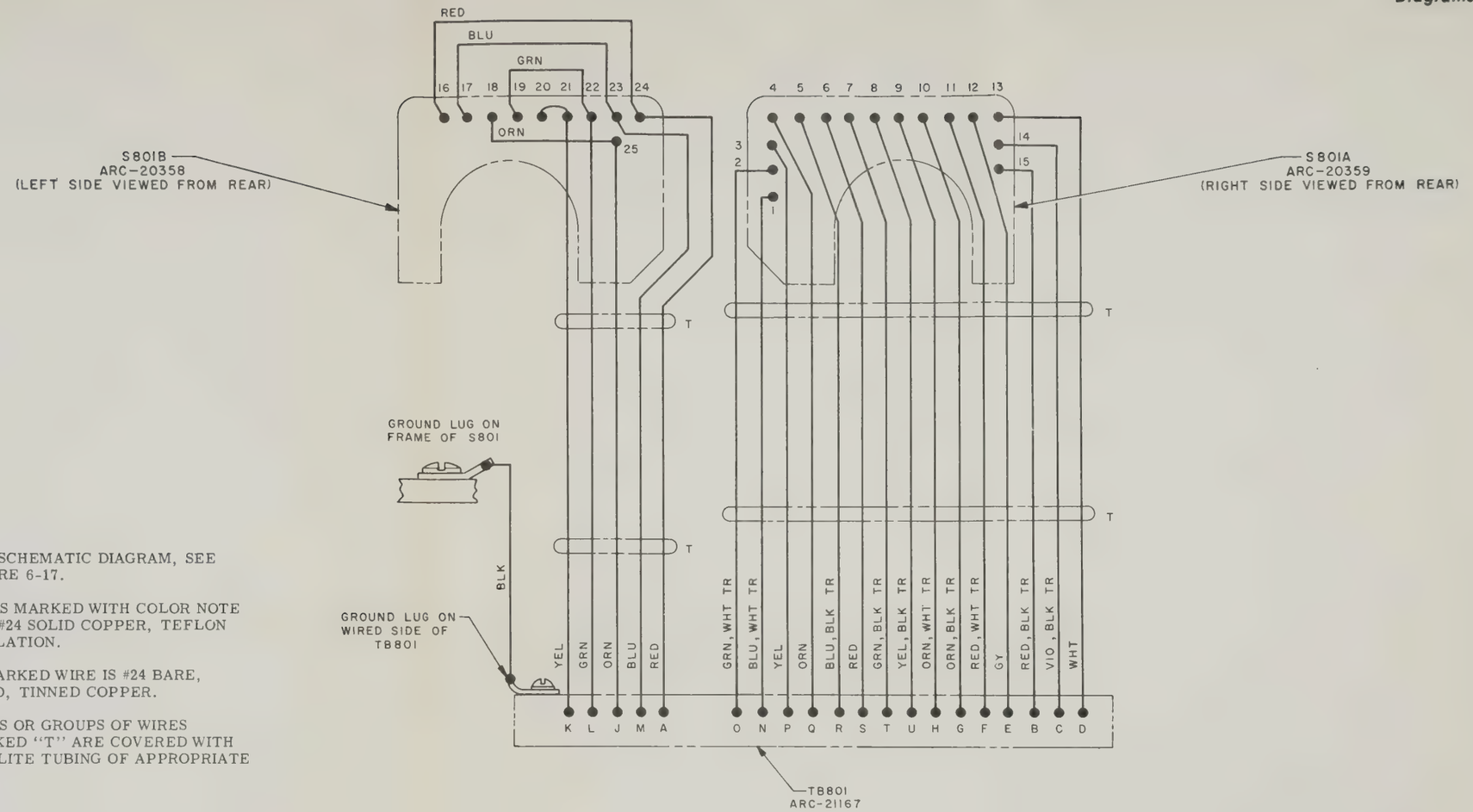
TB801
OUTSIDE VIEW

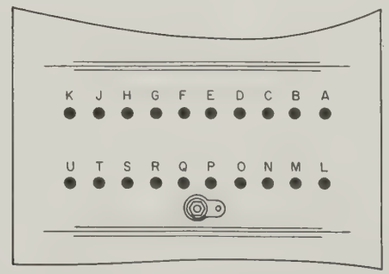
Figure 6–17. Channel Selector Switch ARC-20730, Schematic Diagram



20731F

Figure 6–18. Channel Selector Switch ARC-20730, Wiring Diagram





TERMINAL PLATE
(WIRED SIDE)

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-17.
2. WIRES MARKED WITH COLOR NOTE ARE #24 SOLID COPPER, TEFLON INSULATION.
3. UNMARKED WIRE IS #24 BARE, SOLID, TINNED COPPER.
4. WIRES OR GROUPS OF WIRES MARKED "T" ARE COVERED WITH VINYLITE TUBING OF APPROPRIATE SIZE.

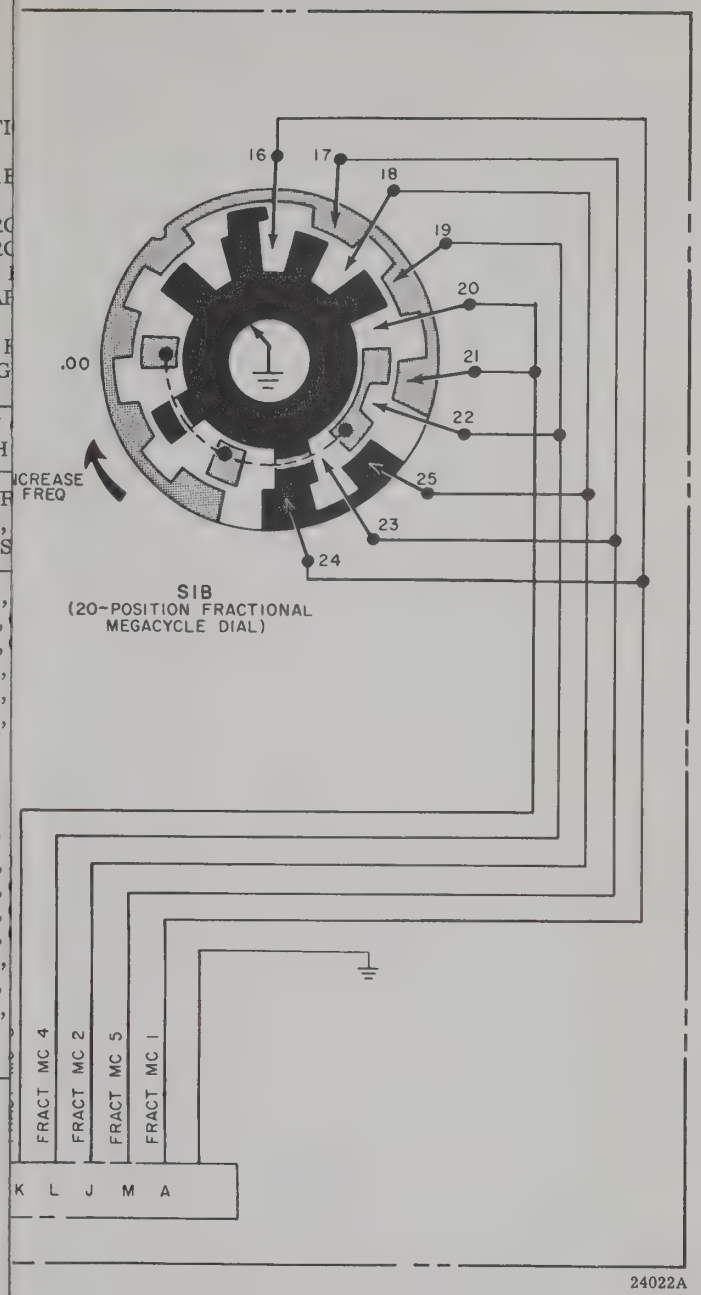
20731F

Figure 6–18. Channel Selector Switch ARC-20730, Wiring Diagram

NOTES:

1. FOR WIRING DIAGRAM, SEE FI
2. SWITCH SECTIONS S1A AND S1E
3. S1A CONTROLS TERMINAL GRO
   S1B CONTROLS TERMINAL GRO
   S1B, CERTAIN TERMINALS IN
   TERMINALS OF THE GROUP AF
4. TERMINALS C, D, E, F, AND
   SWITCH. SEE TABLE AND FIG

TABULATION IN EACH		
S1A	GROUP B, G, U, T, R	GR S, Q, (S
118	B, G, T	P,
119	B, G, U, R	S,
120	B, G, U, T	S,
121	G, U, T, R	Q,
122	U, T, R	P,
123	T, R	O,
124	B, R	N
125	G	S
126	U	Q
127	T	P
128	R	O
129	B	S,
130	B, G	S,
131	G, U	S,
132	U, T	S,
133	B, T, R	Q,
134	G, R	S,
135	B, U	Q,



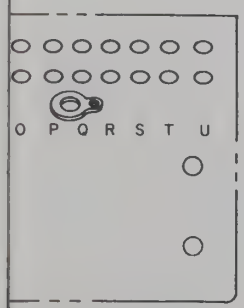


Figure 6–19. CC-10A Custom Control Unit, Schematic Diagram

NOTES:

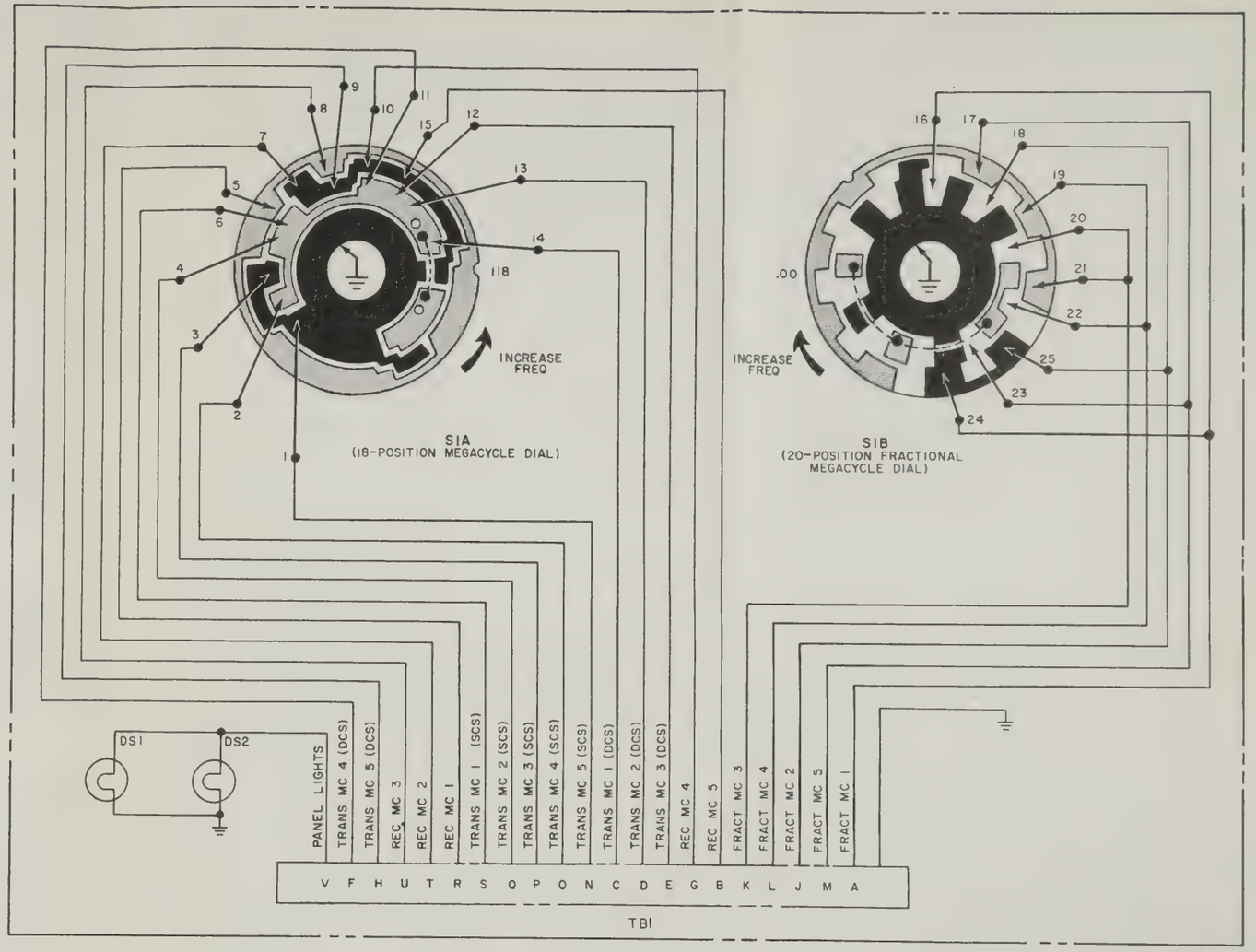
1. FOR WIRING DIAGRAM, SEE FIGURE 6-20.
2. SWITCH SECTIONS S1A AND S1B ARE SHOWN IN THE 118.00-MC POSITION.
3. S1A CONTROLS TERMINAL GROUPS B, G, U, T, R; S, Q, P, O, N; AND C, D, E, F, H. S1B CONTROLS TERMINAL GROUP A, J, K, L, M. AT EACH POSITION OF S1A AND S1B, CERTAIN TERMINALS IN EACH GROUP ARE GROUNDED AND THE OTHER TERMINALS OF THE GROUP ARE CONNECTED TOGETHER FREE OF GROUND.
4. TERMINALS C, D, E, F, AND H ARE FOR "DCS" OPERATION FROM AN EXTERNAL SWITCH. SEE TABLE AND FIGURE 2-16.

TABULATION OF GROUNDED TERMINALS IN EACH GROUP (NOTES 3 & 4)

S1A	GROUP B, G, U, T, R	GROUP S, Q, P, O, N (SCS)	GROUP C, D, E, F, H (DCS)	S1B	GROUP A, J, K, L, M
118	B, G, T	P, N	H	.00	A, J
119	B, G, U, R	S, O	C	.05	A, J, K
120	B, G, U, T	S, Q, N	D	.10	A, M
121	G, U, T, R	Q, P	E	.15	A, J, K, L
122	U, T, R	P, O	F	.20	L
123	T, R	O, N	C, H	.25	J, K, L, M
124	B, R	N	C, D	.30	K
125	G	S	C, D, E	.35	A, K, L, M
126	U	Q	C, D, E, F	.40	J
127	T	P	D, E, F, H	.45	J, L, M
128	R	O	C, E, F, H	.50	A
129	B	S, N	D, F, H	.55	A, K, M
130	B, G	S, Q	E, H	.60	M
131	G, U	S, Q, P	C, F	.65	J, L
132	U, T	S, Q, P, O	C, D, H	.70	L, M
133	B, T, R	Q, P, O, N	D, E	.75	K, M
134	G, R	S, P, O, N	E, F	.80	K, L
135	B, U	Q, O, N	F, H	.85	A, L
				.90	J, K
				.95	A, J, M

CONNECTED TO GROUND

INSULATED FROM GROUND AND CONNECTED TOGETHER



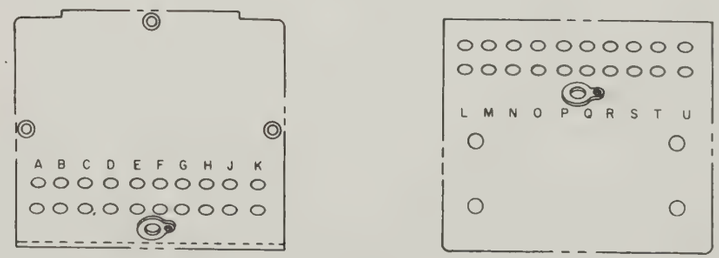
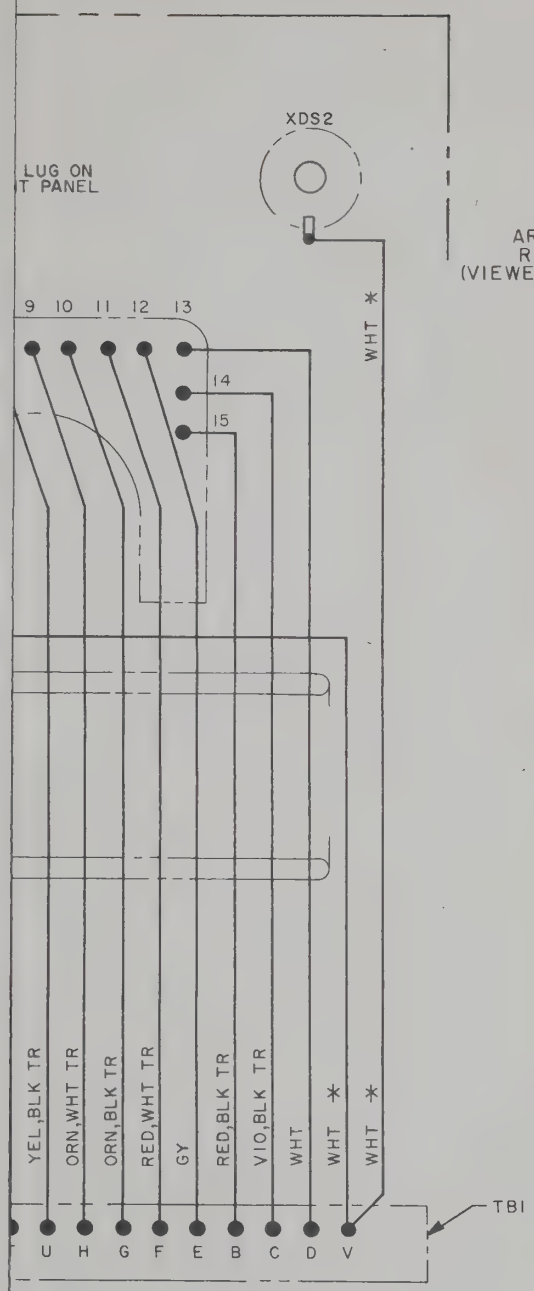
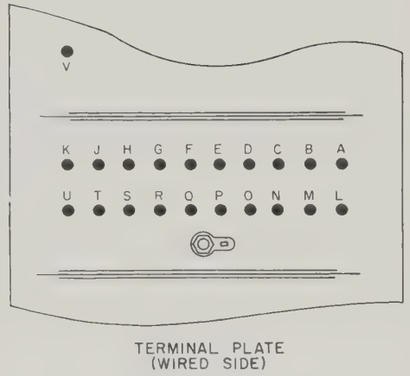


Figure 6–19. CC-10A Custom Control Unit, Schematic Diagram

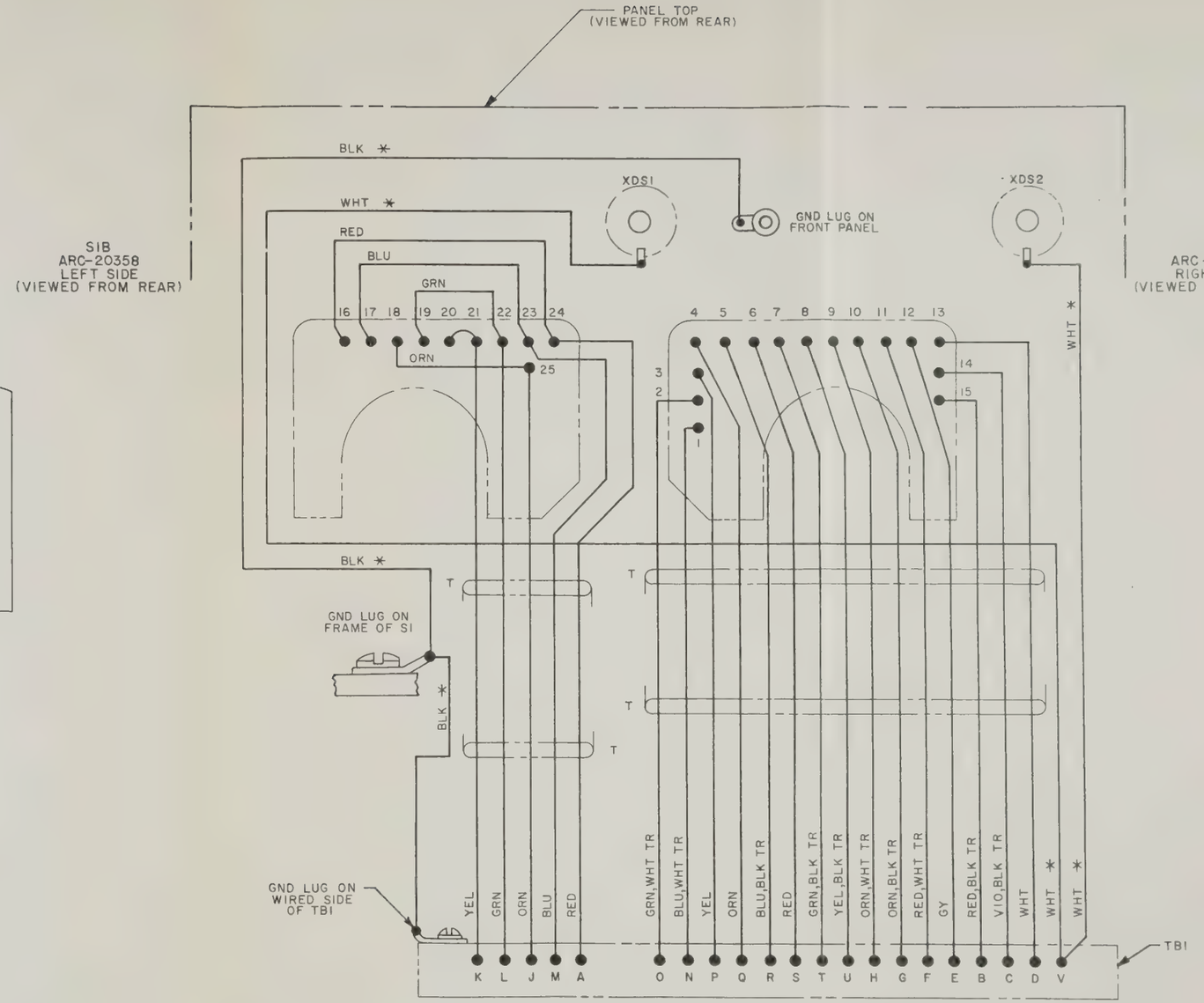


24021A

Figure 6–20. CC-10A Custom Control Unit, Wiring Diagram



TERMINAL PLATE
(WIRED SIDE)



NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-19.
2. WIRES MARKED WITH COLOR NOTE ARE #24 SOLID COPPER, TEFLON INSULATION. WIRES MARKED WITH COLOR NOTE AND AN ASTERISK (*) ARE #22 SOLID COPPER, TEFLON INSULATION.
3. UNMARKED WIRE IS #24 BARE, SOLID, TINNED COPPER.
4. GROUPS OF WIRES MARKED "T" ARE COVERED WITH VINYLITE TUBING OF APPROPRIATE SIZE.

24021A

Figure 6–20. CC-10A Custom Control Unit, Wiring Diagram

Difference Data

for

ARC TYPE T-25B VHF TRANSMITTER

(Supplement to Instruction Book for
ARC Type T-25A VHF Transmitter)

AIRCRAFT RADIO CORPORATION
Boonton, New Jersey

7010123
ARCIB-T25B-1
November 1960
Printed in U.S.A.

ADDENDUM TO SUPPLEMENT

for

ARC TYPE T-25B

VHF TRANSMITTER

Some production units of the T-25B Transmitter use crystal frequencies (listed below) which are different than those listed on Figure 6-1A or referenced in the text of this supplement. The use of these frequencies has no effect on over-all operation of the T-25B. Before replacing any crystal, check the frequency stamped on the holder and select a replacement crystal of the same frequency either from the following table or from the table of Figure 6-1A. Attach this addendum to Figure 6-1A for future reference.

Ref Desig	Frequency MC	ARC Part No.	Ref Desig	Frequency MC	ARC Part No.
Y101	53.000	19658-5300	Y121	10.00	19657-1000
Y102	54.000	19658-5400	Y122	10.10	19657-1010
Y103	55.000	19658-5500	Y123	10.20	19657-1020
Y104	56.000	19658-5600	Y124	10.30	19657-1030
Y105	57.000	19658-5700	Y125	10.40	19657-1040
Y106	58.000	19658-5800	Y126	10.50	19657-1050
Y107	59.000	19658-5900	Y127	10.60	19657-1060
Y108	60.000	19658-6000	Y128	10.70	19657-1070
Y109	61.000	19658-6100	Y129	10.80	19657-1080
Y110	62.000	19658-6200	Y130	10.90	19657-1090
Y111	62.500	19658-6250	Y131	10.95	19657-1095
Y112	61.500	19658-6150	Y132	10.85	19657-1085
Y113	60.500	19658-6050	Y133	10.75	19657-1075
Y114	59.500	19658-5950	Y134	10.65	19657-1065
Y115	58.500	19658-5850	Y135	10.55	19657-1055
Y116	57.500	19658-5750	Y136	10.45	19657-1045
Y117	56.500	19658-5650	Y137	10.35	19657-1035
Y118	55.500	19658-5550	Y138	10.25	19657-1025
Y119	54.500	19658-5450	Y139	10.15	19657-1015
Y120	53.500	19658-5350	Y140	10.05	19657-1005

DIFFERENCE DATA

for

ARC TYPE T-25B VHF TRANSMITTER

INTRODUCTION

This supplement contains difference data for the ARC Type T-25B VHF Transmitter and its associated units: the ARC Type C-82B Control Unit and the ARC Type CC-13A Custom Control Unit.

All information in the basic instruction book for the ARC Type T-25A VHF Transmitter, ARC Type C-82A Control Unit, and ARC Type CC-10A Custom Control Unit is relatively applicable to the similar units covered by this supplement, except where specific differences are noted.

For cross-reference purposes, paragraph numbers and headings, and figure numbers in this supplement follow the same sequence as in the basic instruction book. An omission of a paragraph heading or illustration indicates that the basic information applies.

SECTION I

GENERAL INFORMATION

1-2. PURPOSE.

The ARC Type T-25B VHF Transmitter is an airborne, 400-channel, voice amplitude-modulated transmitter. The transmitter is electrically tuned and crystal controlled, and covers the frequency range of 116.00 - 135.95 mc in 50-kc steps to provide a total of 400 channels.

1-3. SPECIFICATIONS.

Frequency: 116.00 - 135.95 mc

Number of Channels: 400

Tuning: Automatic, crystal controlled. Twenty crystals on megacycle drum; fundamental frequency range, 53.025 - 62.525 mc in 0.5-mc steps. Twenty crystals on fractional megacycle drum; frequency range, 9.95 - 10.90 mc in 0.05-mc steps.

Diode Complement: 1N90 R-f output detector
1N1351A Voltage regulator diode
1N1364 Transient detector
HD-6226 Transient limiter
HD-6226 Transient limiter
HD-6226 Transient limiter

1-6. DESCRIPTION.

Internally, the T-25B is identical with the T-25A except for the megacycle crystal drum and associated wiring, the addition of two diodes to tuner assembly A102, and a modification in the diode circuit for TEST jack J104. The T-25B megacycle crystal drum has 20 crystals installed in a 20-position drum with the crystals arranged around the drum in a frequency pattern similar to that used for the fractional megacycle crystal drum. Two additional diodes, CR103 and CR104, are connected across the solenoids of K101 and K102, respectively, to limit the inductive surges of the relay coils when deenergized at the end of a tuning cycle. The modified diode

circuit for TEST jack J104 improves spurious output characteristics. The T-25B has the same overall dimensions as the T-25A and requires the same mounting; however, the T-25B is not electrically interchangeable with the T-25A. J111 of the T-25B is inverted, as compared with J111 of the T-25A, to prevent installation of a T-25B in a T-25A rack. Schematic and wiring diagrams for the T-25B are shown in Figures 6-1A and 6-2A. Modifications of subassembly wiring diagrams are shown in Figures 6-3A and 6-4A.

An ARC Type C-82B Control Unit is required to operate the T-25B. The C-82B is similar to the ARC Type C-82A Control Unit except that its megacycle channel selector switch has 20 instead of 18 positions; also, it selects megacycle frequencies from 116 to 135 mc instead of from 118 to 135 mc. In addition, provisions for DCS operation of the T-25B are not included in the C-82B. The C-82B is physically but not electrically interchangeable with a C-82A. J201 in the C-82B has a different keyway than J201 in the C-82A to prevent the use of a C-82B in a C-82A installation. Schematic and wiring diagrams for the C-82B are shown in Figures 6-14A and 6-15A. Interconnection of the T-25B and C-82B is the same as shown in the basic interconnection diagrams (Figures 2-10, 2-12, 2-15) except that an ARC-14320 connector, instead of an ARC-16115 connector, is used for J201.

In place of a C-82B, a custom control installation with an ARC Type CC-13A Custom Control Unit and a power on-off switch may be used. The CC-13A differs from the CC-10A in the same characteristics as the C-82B differs from the C-82A. Schematic and wiring diagrams for the CC-13A are shown in Figures 6-19A and 6-20A.

SECTION II

INSTALLATION AND ADJUSTMENT

2-4. INSTALLATION.

When installing Connector ARC-21983, instead of mounting in the normal-low (N3) position as shown in Figure 2-3, rotate the connector 180 degrees and position on Plate ARC-22287 in the inverted-low (I3) position.

Neither Channel Selector Switch ARC-20730 nor the ARC Type CC-10A Custom Control Unit can be used with the T-25B; instead, use the C-82B or CC-13A.

2-5. ASSOCIATED UNITS.

References in the basic instruction book to SCS-DCS operation do not apply as only SCS operation is possible using the C-82B or CC-13A. Figure 2-16 is therefore not applicable.

Figures 2-10, 2-12, and 2-15 are applicable for use with the T-25B and C-82B, except that an ARC-14320 connector is used for J201 instead of an ARC-16115 connector.

An interconnection diagram for the T-25B and CC-13A is shown in Figure 2-11A. (Figure 2-11 is not applicable.)

Figures 2-13 and 2-14 are applicable for use with the T-25B providing Figure 2-11A is used in place of Figure 2-11 to connect the CC-13A and the SCS-DCS relay, switch, and associated wiring are deleted.

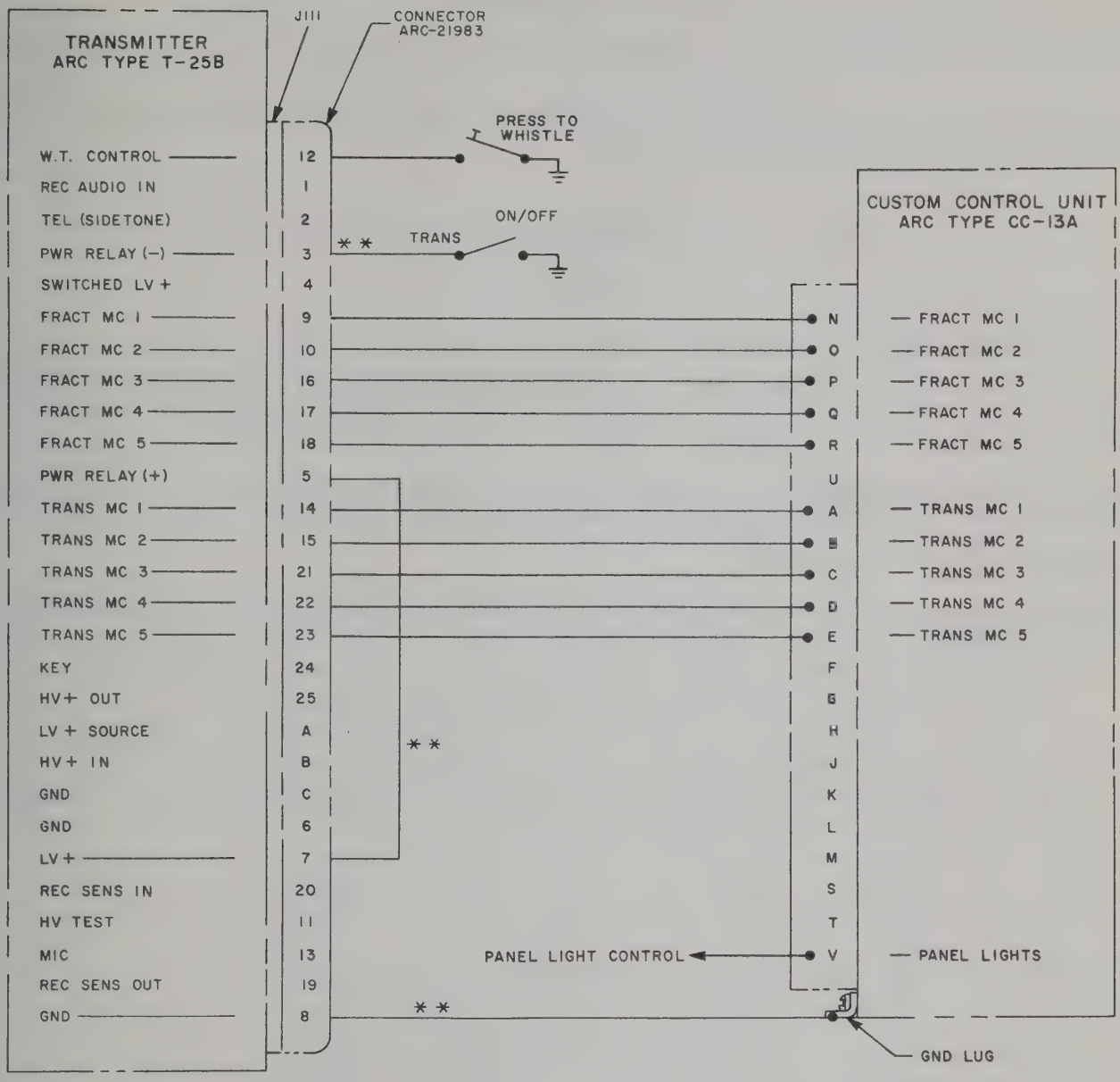
2-7. R-F OUTPUT CHECK.

A meter reading of at least 4 volts dc for any frequency setting will indicate the presence of r-f output at the ANT connector of the T-25B.

SECTION III

OPERATION

Except as required by the use of a C-82B Control Unit or CC-13A Custom Control Unit, and the extension of the frequency range and number of channels, all operating instructions contained in this section also apply to the T-25B Transmitter.



NOTES:

1. FOR COMPLETE SYSTEM DIAGRAMS, SEE FIGURES 2-13, 2-14, AND 2-15.

2. WIRES ARE #20 STRANDED COPPER, EXCEPT WHERE OTHERWISE NOTED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE OF SUFFICIENT SIZE (#16 MINIMUM) TO PROVIDE LESS THAN 0.5-VOLT DROP BETWEEN EQUIPMENT AND SOURCE.

27266X$_1$(TP)

Figure 2-11A. T-25B Transmitter and CC-13A Custom Control Unit, Interconnection Diagram

SECTION IV

PRINCIPLES OF OPERATION

Except for the modifications described in the preceding paragraphs of this supplement, the information contained in this section is applicable to the relative units covered by this supplement.

A schematic diagram for the T-25B is shown in Figure 6-1A. Schematic diagrams of the C-82B and CC-13A are shown in Figures 6-14A and 6-19A, respectively.

SECTION V

MAINTENANCE

5-6. TROUBLE ANALYSIS.

For the T-25B, the "Channeling Trouble Analysis With BTK-25A" paragraph is applicable only if an external control unit, such as the C-82B, is used with the BTK-25A. When using the BTK-25A and C-82B, the panel lamp indications on the H-25A Transmitter Test Unit will be those listed in Table 5-4A.

Figures 5-7 and 5-8 are applicable for use with the T-25B and C-82B except that an ARC-14320 connector is used for J201 of the C-82B instead of an ARC-16115 connector.

5-7. ALIGNMENT AND ADJUSTMENT.

The alignment and adjustment procedures given in this paragraph are applicable to the T-25B except that all references in the text to "118 mc" are "116 mc" for the T-25B.

TABLE 5-4A. BTK-25A LAMP INDICATIONS FOR CONTINUITY CHECKS OF C-82B CHANNEL SELECTOR SWITCHES

Switch Position	TRANS CYCLING Lamps[1]	Switch Position	FRACT CYCLING Lamps[1]
116	B, C	.00	N, O
117	A, B, E	.05	N, O, P
118	C, D	.10	N, R
119	A, D	.15	N, O, P, Q
120	D, E	.20	Q
121	C, E	.25	O, P, Q, R
122	E	.30	P
123	B, D	.35	N, P, Q, R
124	A	.40	O
125	A, C, E	.45	O, Q, R
126	B	.50	N
127	B, D, E	.55	N, P, R
128	C	.60	R
129	A, C, D, E	.65	O, Q
130	D	.70	Q, R
131	B, C, D, E	.75	P, R
132	A, E	.80	P, Q
133	A, B, C, D	.85	N, Q
134	A, B	.90	O, P
135	A, B, C	.95	N, O, R

[1]Letters refer to illuminated lamps only. Letters also indicate grounded control wire terminals of J201 in C-82B.

SECTION VI

DIAGRAMS

FIGURE 6-1A.

A schematic diagram for the T-25B Transmitter is shown in Figure 6-1A.

FIGURE 6-2A.

A wiring diagram for the T-25B Transmitter is shown in Figure 6-2A.

FIGURE 6-3A.

Modification of the wiring diagram for the transmitter assembly of the T-25A Transmitter (Figure 6-3) as applicable to the T-25B Transmitter is shown in Figure 6-3A.

FIGURE 6-4A.

Modification of the wiring diagram for the tuner assembly of the T-25A Transmitter (Figure 6-4) as applicable to the T-25B Transmitter is shown in Figure 6-4A.

FIGURES 6-14A, 6-15A AND 6-16A.

A schematic diagram and a wiring diagram of the C-82B Control Unit are shown in Figures 6-14A and 6-15A, respectively. A continuity sequence table for the C-82B Control Unit is shown in Figure 6-16A.

FIGURES 6-19A AND 6-20A.

A schematic diagram and a wiring diagram of the CC-13A Custom Control Unit are shown in Figure 6-19A and 6-20A, respectively.

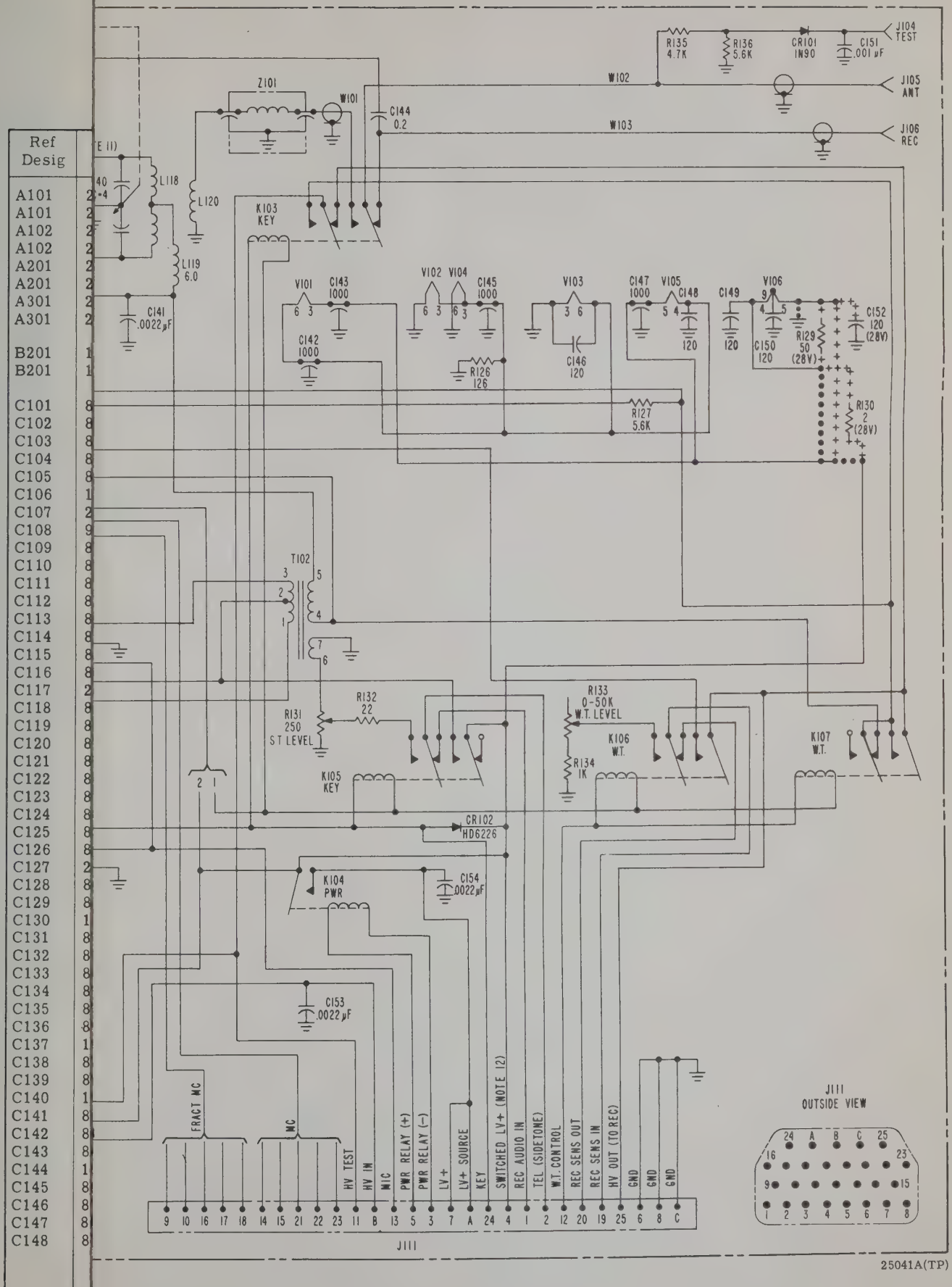


Figure 6–1 A. T-25B Transmitter, Schematic Diagram

ARC PART NO.

Ref Desig	ARC Part No.
A101	22328-0014
A101	22328-0028
A102	22367-0014
A102	22367-0028
A201	22277-0014
A201	22277-0028
A301	22337-0014
A301	22337-0028
B201	18800
B201	18801
C101	8796-0121
C102	8870-0510
C103	8791-0200
C104	8870-0510
C105	8832
C106	19603
C107	21326
C108	9280
C109	8765-0240
C110	8765-0240
C111	8765-0240
C112	8765-0240
C113	8870-0241
C114	8870-0241
C115	8791-0200
C116	8791-0200
C117	21326
C118	8791-9701
C119	8791-9401
C120	8796-0121
C121	8796-0121
C122	8625-9224
C123	8796-0121
C124	8626-9474
C125	8870-0510
C126	8870-0510
C127	21326
C128	8627-9153
C129	8627-9103
C130	10281
C131	8796-0121
C132	8796-0121
C133	8625-9224
C134	8796-0121
C135	8791-9801
C136	8791-0200
C137	19639
C138	8791-0200
C139	8796-0121
C140	19420
C141	8625-9224
C142	8832
C143	8832
C144	10281
C145	8832
C146	8796-0121
C147	8832
C148	8796-0121

Ref Desig	ARC Part No.
C149	8796-0121
C150	8796-0121
C151	8625-9104
C152	8796-0121
C153	8625-9224
C154	8625-9224
C155	8796-0121
C301	8914-0100
C302	8914-0100
C303	8914-0100
C304	8627-9223
C305	8626-9334
C306	8626-9334
CR101	19663
CR102	23037
CR103	23037
CR104	23037
CR301	8923-0100
CR302	22298-0360
J101	19336
J102	p/o 19669 and 19661
J103	19336
J104	8803-5410
J105	15185
J106	15185
J107	p/o 19669
J108	21873
J109	9391
J110	22153
J111	21984
K101	19664
K101	19665
K102	19664
K102	19665
K103	22276-0014
K103	22276-0028
K104	14484
K104	14485
K105	22276-0014
K105	22276-0028
K106	12587
K106	12588
K107	12587
K107	12588
L101	8877-9682
L102	19620
L103	19923
L104	8877-9101
L105	8877-9101
L106	14141
L107	14141
L108	14141
L109	19619
L110	14141
L111	19620
L112	22206
L113	22206
L114	8877-9101
L115	22142

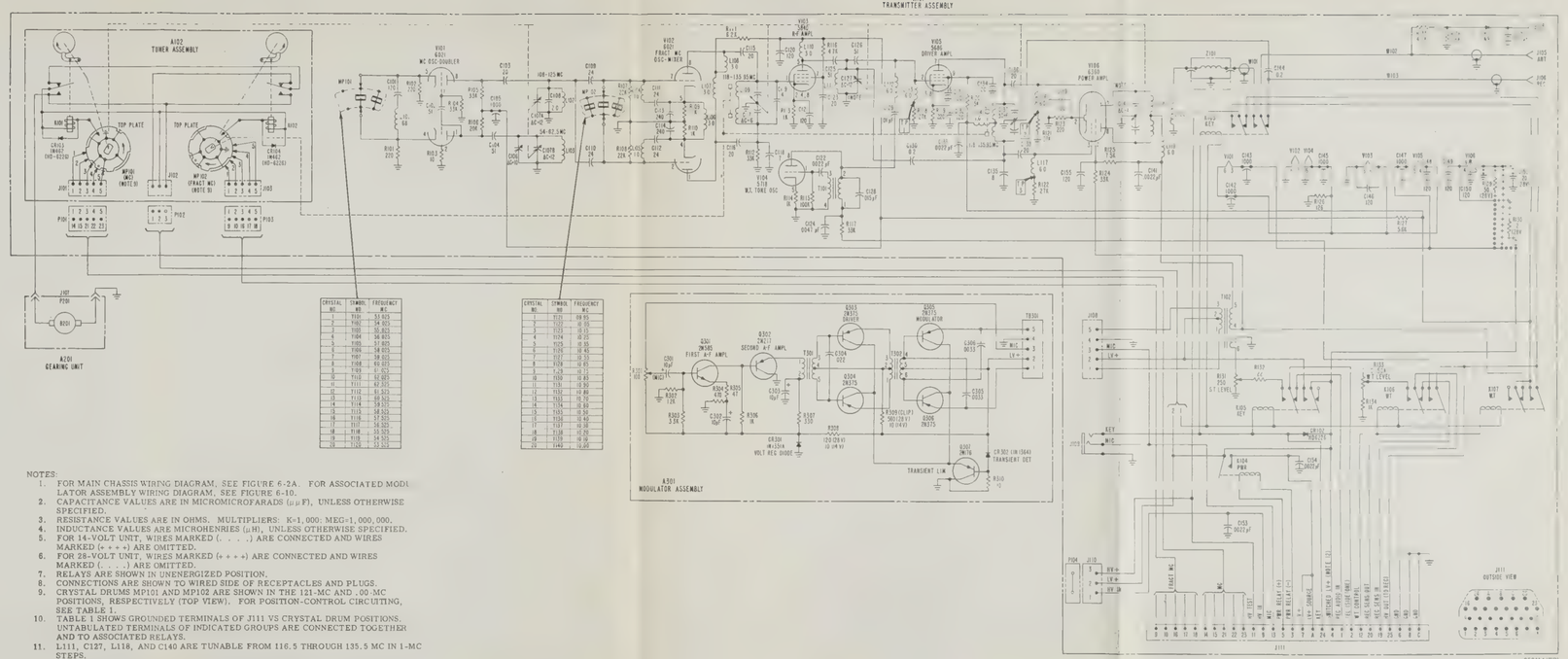
Ref Desig	ARC Part No.
L116	22206
L117	22206
L118	21833
L119	22206
L120	p/o 22147
MP101	p/o 22367-0014
MP101	p/o 22367-0028
MP102	p/o 22367-0014
MP102	p/o 22367-0028
P101	19339
P102	22190
P103	19339
P104	22151
P201	p/o 18800
P201	p/o 18801
Q301	22292
Q302	22293
Q303	22289
Q304	22289
Q305	22289
Q306	22289
Q307	22290
R101	200-0221
R102	200-0221
R103	204-0100
R104	200-0333
R105	201-0333
R106	201-0203
R107	200-0223
R108	200-0223
R109	200-0102
R110	200-0102
R111	201-0022
R112	200-0333
R113	201-0102
R114	200-0102
R115	200-0104
R116	201-0472
R117	201-0333
R118	201-0273
R119	201-0221
R120	201-0153
R121	201-0273
R122	201-0273
R123	203-0221
R124	201-0333
R125	201-0752
R126	209-0006
R127	203-0562
R129	207-0500
R130	209-0009
R131	8915-0251
R132	201-0220
R133	8915-0503
R134	201-0102
R135	201-0472
R136	201-0562

Ref Desig	ARC Part No.
R301	8915-0101
R302	200-0122
R303	200-0332
R304	200-0471
R305	200-0470
R306	200-0102
R307	200-0331
R308	203-0100
R308	203-0121
R309	202-0100
R309	202-0561
R310	202-0100
T101	18052
T102	22195-0014
T102	22195-0028
T301	22340
T302	22339
TB301	22334
V101	700-0136
V102	700-0136
V103	700-0129
V104	700-0122
V105	700-0121
V106	700-0204
W101	18327
W102	18327
W103	18327
XV105	21547
XV108	21547
Y101	19658-5302
Y102	19658-5402
Y103	19658-5502
Y104	19658-5602
Y105	19658-5702
Y106	19658-5802
Y107	19658-5902
Y108	19658-6002
Y109	19658-6102
Y110	19658-6202
Y111	19658-6252
Y112	19658-6152
Y113	19658-6052
Y114	19658-5952
Y115	19658-5852
Y116	19658-5752
Y117	19658-5652
Y118	19658-5552
Y119	19658-5452
Y120	19658-5352
Y121	19657-9950
Y122	19657-1005
Y123	19657-1015
Y124	19657-1025
Y125	19657-1035
Y126	19657-1045

Ref Desig	ARC Part No.
Y127	19657-1055
Y128	19657-1065
Y129	19657-1075
Y130	19657-1085
Y131	19657-1090
Y132	19657-1080
Y133	19657-1070
Y134	19657-1060
Y135	19657-1050
Y136	19657-1040
Y137	19657-1030
Y138	19657-1020
Y139	19657-1010
Y140	19657-1000
Z101	22147

TABLE 1

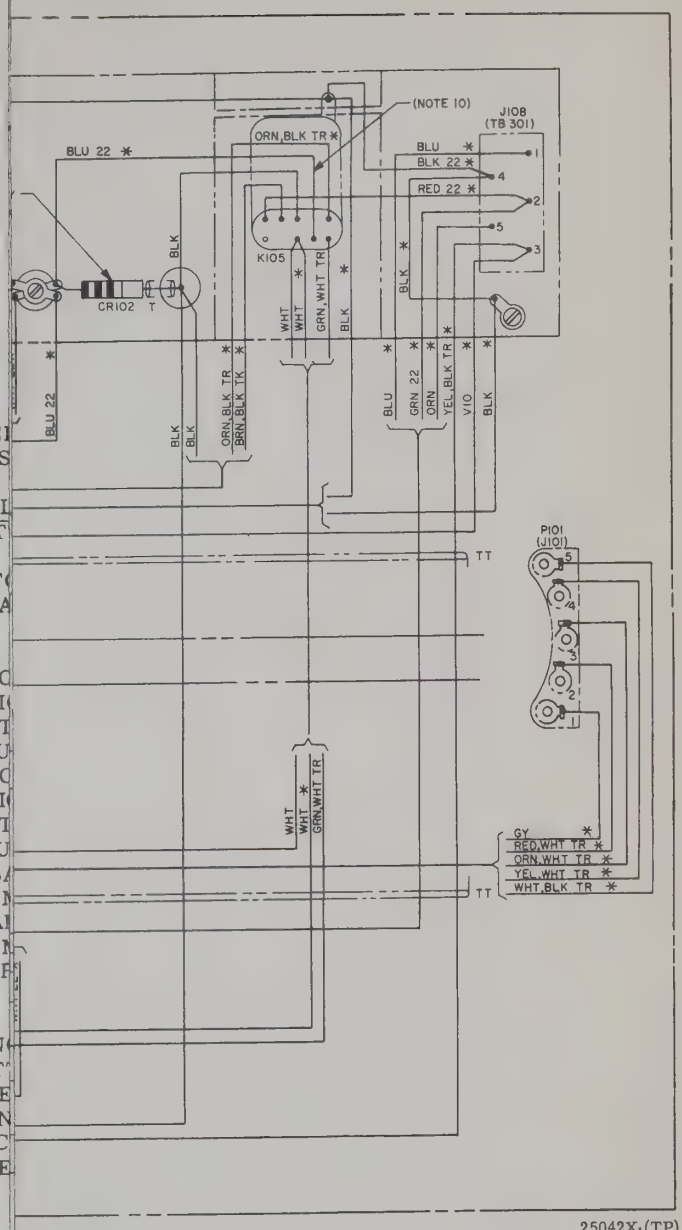
DIAL	MP102 J111 9, 10, 16, 17, 18	DIAL	MP101 J111 14, 15, 21, 22, 23
.00	9, 10	116	15, 21
.10	9, 18	118	21, 22
.20	17	120	22, 23
.30	16	122	23
.40	10	124	14
.50	9	126	15
.60	18	128	21
.70	17, 18	130	22
.80	16, 17	132	14, 23
.90	10, 16	134	14, 15
.95	9, 10, 18	135	14, 15, 21
.85	9, 17	133	14, 15, 21, 22
.75	16, 18	131	15, 21, 22, 23
.65	10, 17	129	14, 21, 22, 23
.55	9, 16, 18	127	15, 22, 23
.45	10, 17, 18	125	14, 21, 23
.35	9, 16, 17, 18	123	15, 22
.25	10, 16, 17, 18	121	21, 23
.15	9, 10, 16, 17	119	14, 22
.05	9, 10, 16	117	14, 15, 23



NOTES:

1. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 6-2A. FOR ASSOCIATED MODULATOR ASSEMBLY WIRING DIAGRAM, SEE FIGURE 6-10.
2. CAPACITANCE VALUES ARE IN MICROMICROFARADS (μμF), UNLESS OTHERWISE SPECIFIED.
3. RESISTANCE VALUES ARE IN OHMS. MULTIPLIERS: K=1,000; MEG=1,000,000.
4. INDUCTANCE VALUES ARE MICROHENRIES (μH), UNLESS OTHERWISE SPECIFIED.
5. FOR 14-VOLT UNIT, WIRES MARKED (. . . .) ARE CONNECTED AND WIRES MARKED (+ + +) ARE OMITTED.
6. FOR 28-VOLT UNIT, WIRES MARKED (+ + +) ARE CONNECTED AND WIRES MARKED (. . . .) ARE OMITTED.
7. RELAYS ARE SHOWN IN UNENERGIZED POSITION.
8. CONNECTIONS ARE SHOWN TO WIRED SIDE OF RECEPTACLES AND PLUGS.
9. CRYSTAL DRUMS MP101 AND MP102 ARE SHOWN IN THE 121-MC AND .00-MC POSITIONS, RESPECTIVELY (TOP VIEW). FOR POSITION-CONTROL CIRCUITING, SEE TABLE 1.
10. TABLE 1 SHOWS GROUNDED TERMINALS OF J111 VS CRYSTAL DRUM POSITIONS. UNTABULATED TERMINALS OF INDICATED GROUPS ARE CONNECTED TOGETHER AND TO ASSOCIATED RELAYS.
11. L111, C127, L118, AND C140 ARE TUNABLE FROM 116.5 THROUGH 135.5 MC IN 1-MC STEPS.
12. THIS TERMINAL PROVIDES LV+ TO EXTERNAL EQUIPMENT; CURRENT DRAIN NOT TO EXCEED 1 AMPERE.

Figure 6-1 A. T-25B Transmitter, Schematic Diagram



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NOTES:

1. FOR SCHEMATIC DIAGRAM, SEI
2. ASSOCIATED WIRING DIAGRAMS ARE AS FOLLOWS:

SYMBOL NO.	ASSEMBL
A101	TRANSMIT
A102	TUNER
A301	MODULAT(

3. FOR COMPLETE WIRING, SEE A
4. WIRES:

MARKING	
COLOR NOTE	#24 SC TI(
COLOR NOTE PLUS (*)	#24 ST SU-
COLOR NOTE PLUS (22)	#22 SC TI(
COLOR NOTE PLUS (22*)	#22 ST SU
UNMARKED	#24 BA

5. FOR 28-VOLT CHASSIS, WIRES M AND WIRES MARKED (. . . .) AI
6. FOR 14-VOLT CHASSIS, WIRES M AND WIRES MARKED (+ + + +) AF
7. TEFLON TUBING OF .036-INCH MARKED "T."
8. SPIRAL-CUT TUBING OF 1/8-IN GROUPS OF WIRES MARKED "T"
9. PLUGS AND RECEPTACLES ARE
10. TEFLON TUBING (1/4-INCH LEN STALLED OVER WIRES CONNEC PUSHED DOWN OVER RELAY TE

Figure 6–2 A. T-25B Transmitter, Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1A.
2. ASSOCIATED WIRING DIAGRAMS OF SEPARATE SUBASSEMBLIES ARE AS FOLLOWS:

SYMBOL NO.	ASSEMBLY	FIGURE NO.
A101	TRANSMITTER	6-3 and 6-3 A
A102	TUNER	6-4 and 6-4 A
A301	MODULATOR	6-10

3. FOR COMPLETE WIRING, SEE ALL VIEWS.
4. WIRES:

MARKING	DESCRIPTION
COLOR NOTE	#24 SOLID COPPER, TEFLON INSULATION
COLOR NOTE PLUS (*)	#24 STRANDED COPPER, TEFLON INSULATION
COLOR NOTE PLUS (22)	#22 SOLID COPPER, TEFLON INSULATION
COLOR NOTE PLUS (22*)	#22 STRANDED COPPER, TEFLON INSULATION
UNMARKED	#24 BARE, SOLID, TINNED COPPER

5. FOR 28-VOLT CHASSIS, WIRES MARKED (+ + + +) ARE CONNECTED AND WIRES MARKED (. . . .) ARE OMITTED.
6. FOR 14-VOLT CHASSIS, WIRES MARKED (. . . .) ARE CONNECTED AND WIRES MARKED (+ + + +) ARE OMITTED.
7. TEFLON TUBING OF .036-INCH I. D. IS INSTALLED OVER WIRE MARKED "T."
8. SPIRAL-CUT TUBING OF 1/8-INCH O. D. IS INSTALLED OVER GROUPS OF WIRES MARKED "TT."
9. PLUGS AND RECEPTACLES ARE VIEWED FROM WIRED SIDE.
10. TEFLON TUBING (1/4-INCH LENGTHS, .091-INCH I. D.) IS INSTALLED OVER WIRES CONNECTED TO K103 AND K105 AND IS PUSHED DOWN OVER RELAY TERMINALS.

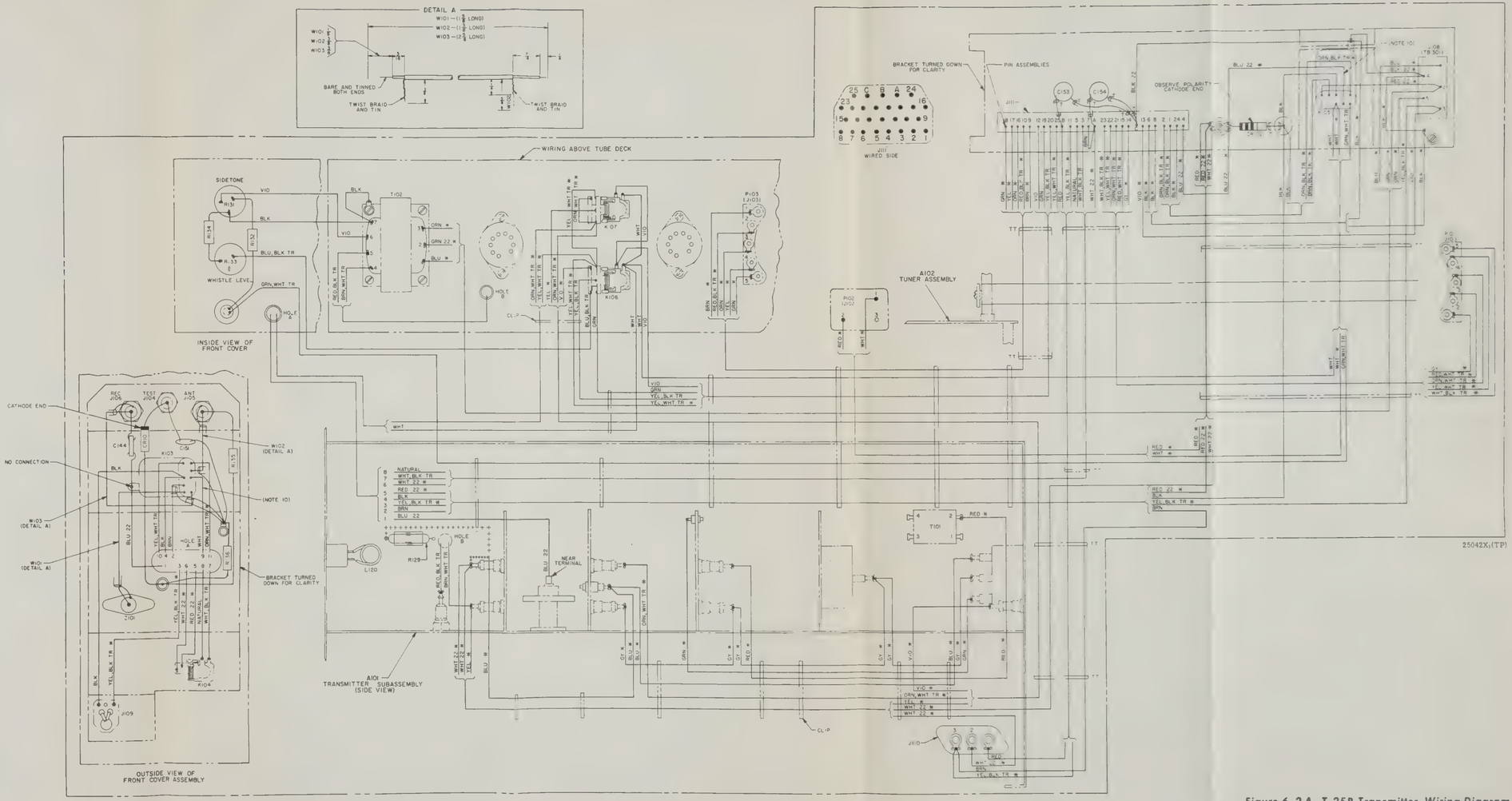
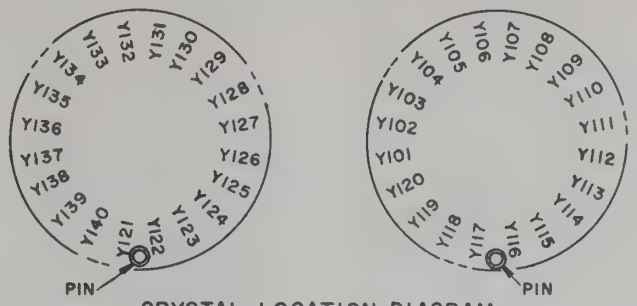
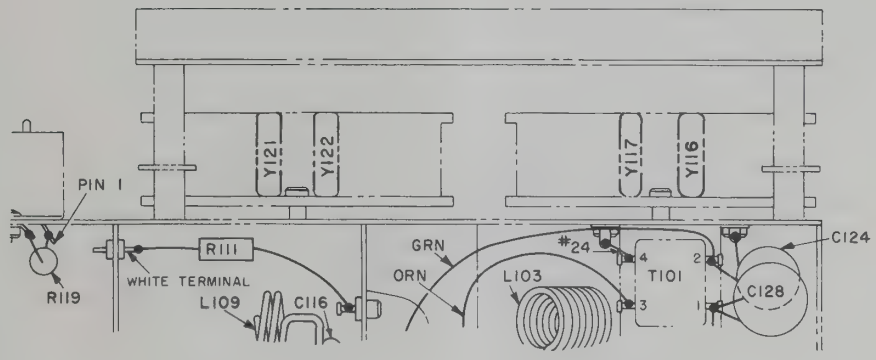


Figure 6-2 A. T-25B Transmitter, Wiring Diagram

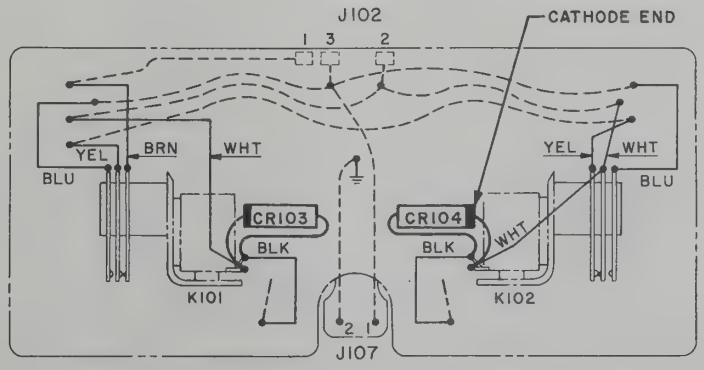


CRYSTAL LOCATION DIAGRAM
(TOP VIEW)



TP3019

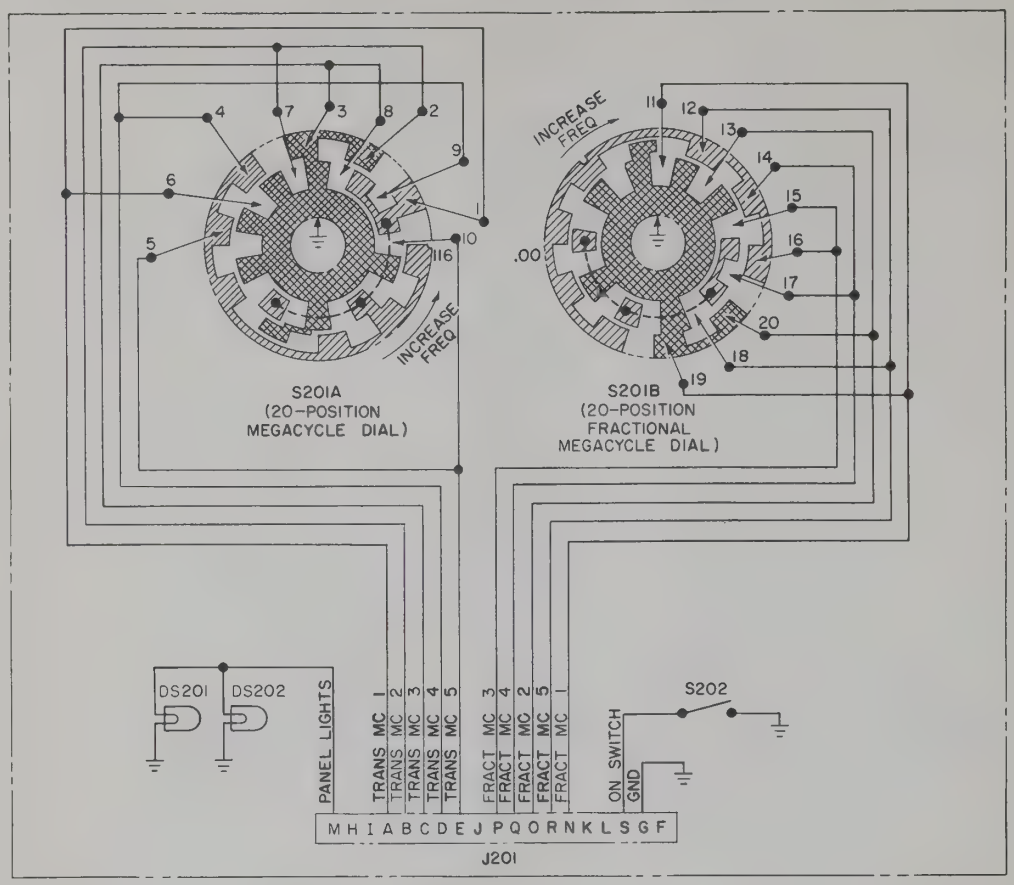
Figure 6-3A. Modification of Figure 6-3 for T-25B Transmitter



VIEW FROM TOP OF TUNER ASSEMBLY
WITH J101 AND J103 DISPLACED

TP3021

Figure 6-4A. Modification of Figure 6-4 for T-25B Transmitter



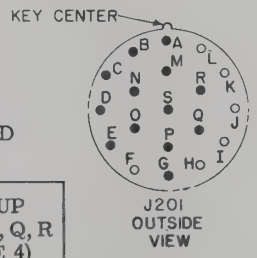


TABLE 1. TABULATION OF GROUNDED TERMINALS IN EACH GROUP

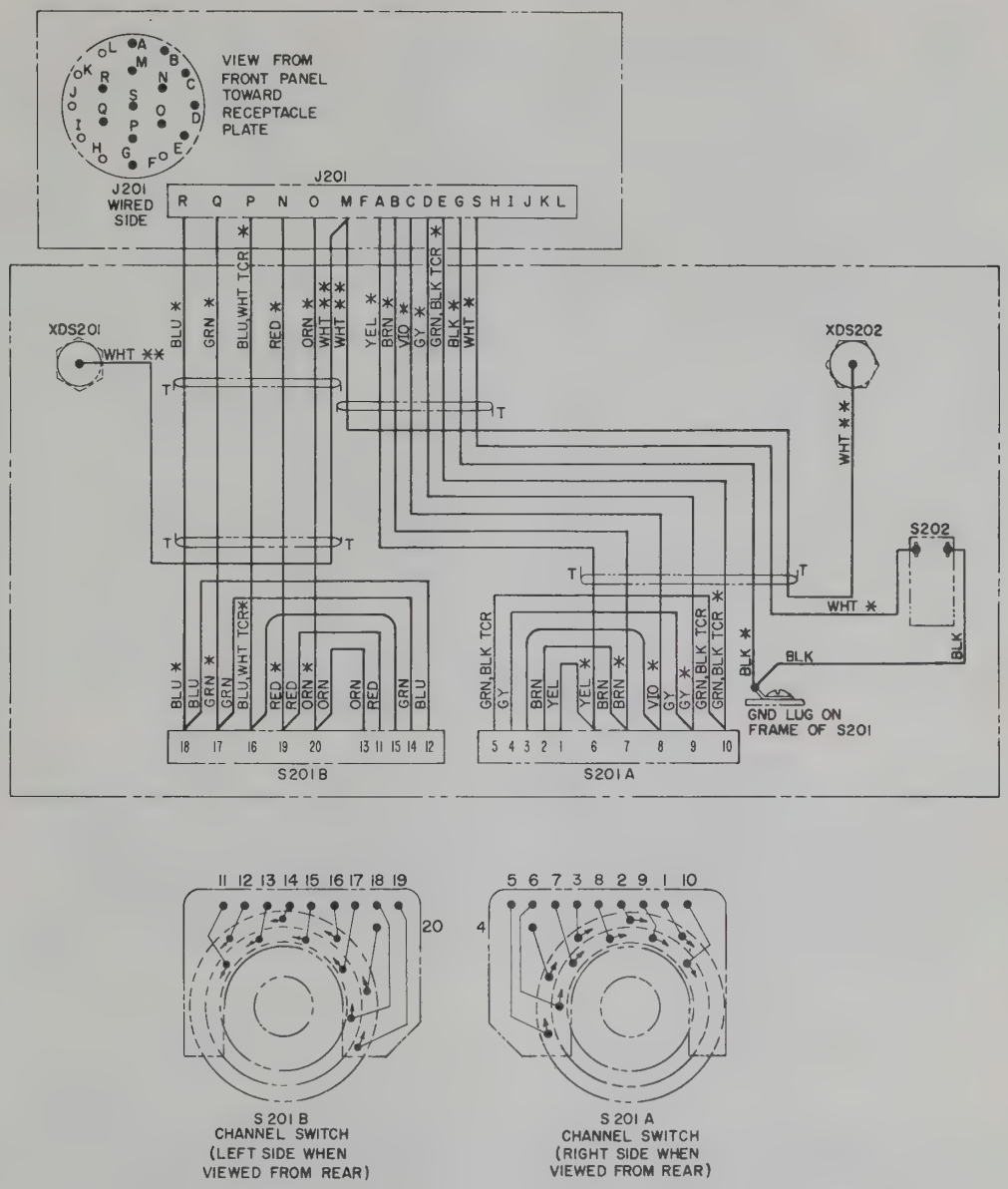
S201A	GROUP A, B, C, D, E (NOTE 4)	S201B	GROUP N, O, P, Q, R (NOTE 4)
116	B, C	.00	N, O
117	A, B, E	.05	N, O, P
118	C, D	.10	N, R
119	A, D	.15	N, O, P, Q
120	D, E	.20	Q
121	C, E	.25	O, P, Q, R
122	E	.30	P,
123	B, D	.35	N, P, Q, R
124	A	.40	O
125	A, C, E	.45	O, Q, R
126	B	.50	N
127	B, D, E	.55	N, P, R
128	C	.60	R
129	A, C, D, E	.65	O, Q
130	D	.70	Q, R
131	B, C, D, E	.75	P, R
132	A, E	.80	P, Q
133	A, B, C, D	.85	N, Q
134	A, B	.90	O, P
135	A, B, C	.95	N, O, R

NOTES:

1. FOR WIRING DIAGRAM, SEE FIGURE 6-15A.
2. SWITCH SECTIONS S201A AND S201B ARE SHOWN IN 116.00-MC POSITION. FOR IDENTIFICATION OF SWITCH TERMINALS, SEE FIGURE 6-15A.
3. SHADED AREAS ON SWITCH SECTION S201A AND S201B INDICATE PLATED SURFACE. DOUBLE CROSS-HATCHED AREAS ARE GROUNDED.
4. S201A CONTROLS TERMINAL GROUP A, B, C, D, E OF J201; S201B CONTROLS GROUP N, O, P, Q, R. AT EACH POSITION OF S201A AND S201B, CERTAIN TERMINALS IN EACH GROUP ARE GROUNDED AND THE OTHER TERMINALS OF THE GROUP ARE CONNECTED TOGETHER, FREE OF GROUND. SEE TABLE 1.

25001A

Figure 6-14A. C-82B Control Unit, Schematic Diagram


VIEW FROM FRONT PANEL TOWARD RECEPTACLE PLATE
J201 WIRED SIDE
J201
R Q P N O M F A B C D E G S H I J K L
XDS201
XDS202
S202
S201B
S201A
GND LUG ON FRAME OF S201
18 17 16 19 20 13 11 15 14 12
5 4 3 2 1 6 7 8 9 10

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-14A.
2. WIRES MARKED WITH COLOR NOTE ARE #24 SOLID COPPER, TEFLON INSULATION.
3. WIRES MARKED WITH COLOR NOTE AND AN ASTERISK (*) ARE #22 STRANDED COPPER, TEFLON INSULATION
4. WIRES MARKED WITH COLOR NOTE AND A DOUBLE ASTERISK (**) ARE #20 STRANDED COPPER, TEFLON INSULATION.
5. UNMARKED WIRE IS #24 BARE, SOLID, TINNED COPPER.
6. WIRES OR GROUPS OF WIRES MARKED "T" ARE COVERED WITH TRANSPARENT VINYLITE TUBING OF APPROPRIATE SIZE.

25002A

Figure 6-15A. C-82B Control Unit, Wiring Diagram

Switch Position (MC)	MC Cycling-SCS J201 Terminal				
	A	B	C	D	E
116	†	*	*	†	†
117	*	*	†	†	*
118	†	†	*	*	†
119	*	†	†	*	†
120	†	†	†	*	*
121	†	†	*	†	*
122	†	†	†	†	*
123	†	*	†	*	†
124	*	†	†	†	†
125	*	†	*	†	*
126	†	*	†	†	†
127	†	*	†	*	*
128	†	†	*	†	†
129	*	†	*	*	*
130	†	†	†	*	†
131	†	*	*	*	*
132	*	†	†	†	*
133	*	*	*	*	†
134	*	*	†	†	†
135	*	*	*	†	†

Switch Position (MC)	Fractional MC Cycling J201 Terminal				
	N	O	P	Q	R
.00	*	*	†	†	†
.05	*	*	*	†	†
.10	*	†	†	†	*
.15	*	*	*	*	†
.20	†	†	†	*	†
.25	†	*	*	*	*
.30	†	†	*	†	†
.35	*	†	*	*	*
.40	†	*	†	†	†
.45	†	*	†	*	*
.50	*	†	†	†	†
.55	*	†	*	†	*
.60	†	†	†	†	*
.65	†	*	†	*	†
.70	†	†	†	*	*
.75	†	†	*	†	*
.80	†	†	*	*	†
.85	*	†	†	*	†
.90	†	*	*	†	†
.95	*	*	†	†	*

NOTES:

1. TO CHECK CONTINUITY OF ANY OF THE CHANNEL SELECTOR SWITCH POSITIONS LISTED IN THE TABLE, USE A VOLT-OHMMETER (SIMPSON MODEL 260, OR EQUIVALENT) AND SET THE RANGE SWITCH TO THE R X 1 SCALE SO THAT POSITIVE CONTACT CAN BE DETERMINED. CONNECT ONE LEAD TO GROUND, TERMINAL G OF J201, AND CONNECT THE OTHER LEAD TO EACH OF THE TERMINALS INDICATED. THE CORRECT CONTINUITY FOR THE SWITCH POSITION BEING CHECKED IS GIVEN BY THE FOLLOWING CODE IN WHICH TERMINAL LEADS HAVING THE SAME SYMBOL ARE CONNECTED TO EACH OTHER.

   * = GROUNDED TERMINAL

   † = UNGROUNDED TERMINAL AND CONNECTED TO OTHER TERMINALS MARKED †

2. AFTER CHECKING THE CONTINUITY OF EACH TERMINAL TO GROUND, REMOVE THE TEST LEAD FROM GROUND AND CONNECT IT TO ONE OF THE TERMINALS MARKED (†). THEN CHECK CONTINUITY WITH ALL OTHER TERMINALS MARKED (†) TO INSURE THAT THEY ARE CONNECTED TOGETHER. FOR EXAMPLE: ASSUMING THE MEGACYCLE CHANNEL SELECTOR SWITCH IS SET AT 134 MC, CORRECT CONTINUITY FOR THIS SWITCH POSITION WOULD BE:

TERMINAL OF J201	CORRECT CONTINUITY
A	* = GROUNDED
B	* = GROUNDED
C	† = UNGROUNDED, CONNECTED TO TERMINALS D AND E
D	† = UNGROUNDED, CONNECTED TO TERMINALS C AND E
E	† = UNGROUNDED, CONNECTED TO TERMINALS C AND D

Figure 6-16A. C-82B Control Unit, Continuity Sequence Table

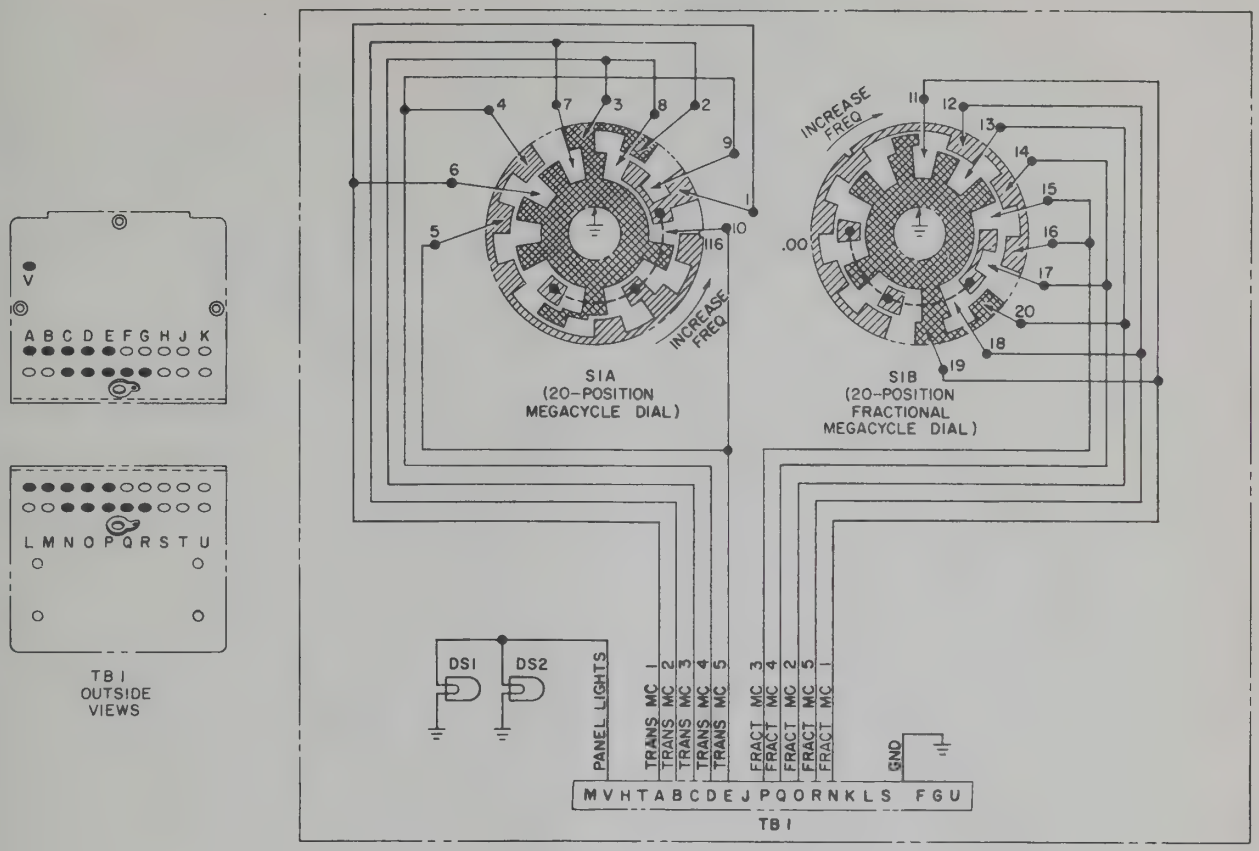


TABLE 1. TABULATION OF GROUNDED TERMINALS IN EACH GROUP

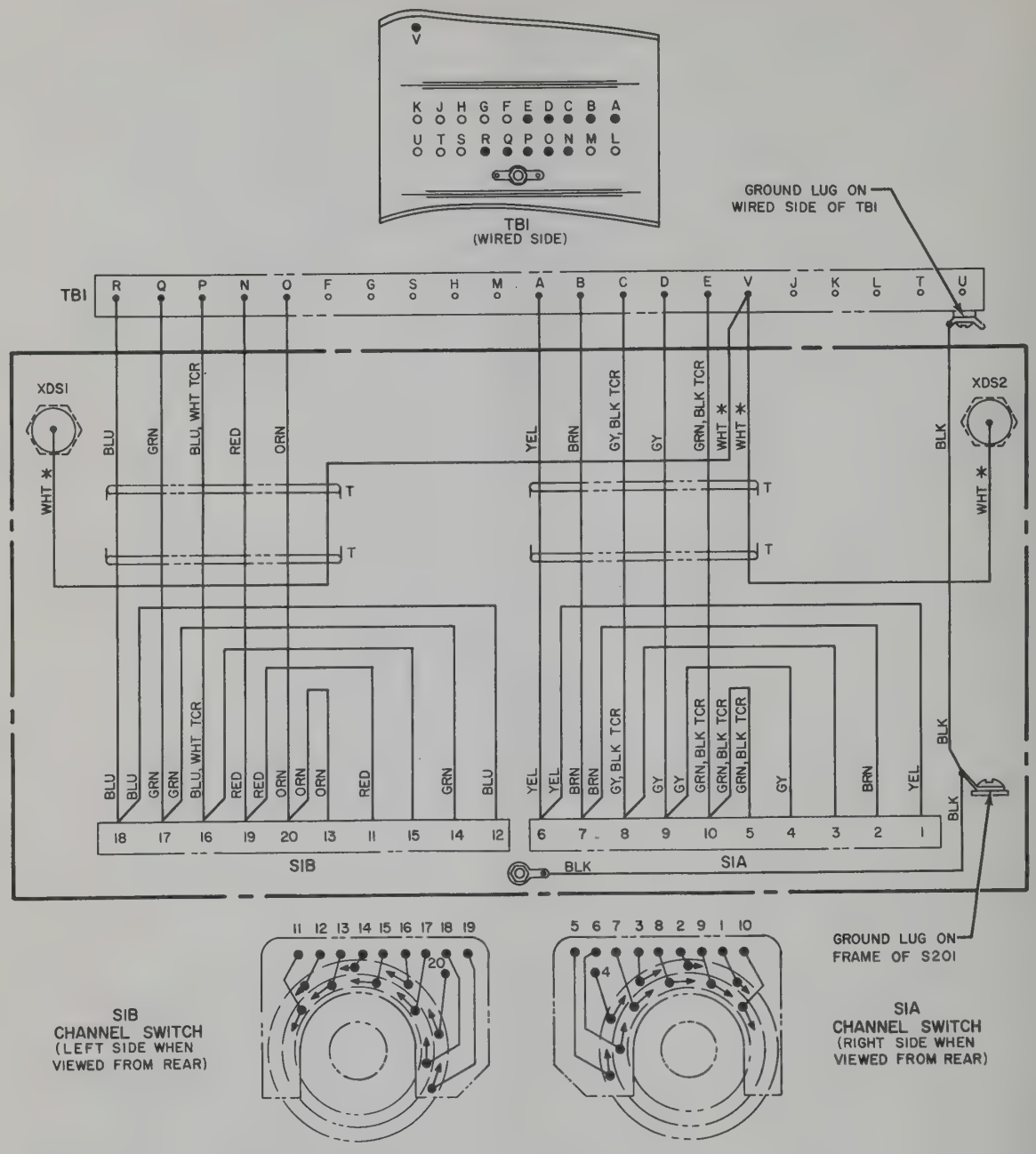
S1A	GROUP A, B, C, D, E (NOTE 4)	S1B	GROUP N, O, P, Q, R (NOTE 4)
116	B, C	.00	N, O
117	A, B, E	.05	N, O, P
118	C, D	.10	N, R
119	A, D	.15	N, O, P, Q
120	D, E	.20	Q
121	C, E	.25	O, P, Q, R
122	E	.30	P,
123	B, D	.35	N, P, Q, R
124	A	.40	O
125	A, C, E	.45	O, Q, R
126	B	.50	N
127	B, D, E	.55	N, P, R
128	C	.60	R
129	A, C, D, E	.65	O, Q
130	D	.70	Q, R
131	B, C, D, E	.75	P, R
132	A, E	.80	P, Q
133	A, B, C, D	.85	N, Q
134	A, B	.90	O, P
135	A, B, C	.95	N, O, R

NOTES:

1. FOR WIRING DIAGRAM, SEE FIGURE 6-20A.
2. SWITCH SECTIONS S1A AND S1B ARE SHOWN IN 116.00-MC POSITION. FOR IDENTIFICATION OF SWITCH TERMINALS, SEE FIGURE 6-20A.
3. SHADED AREAS ON SWITCH SECTIONS S1A AND S1B INDICATE PLATED SURFACE. DOUBLE CROSS-HATCHED AREAS ARE GROUNDED.
4. S1A CONTROLS TERMINAL GROUP A, B, C, D, E OF TB1; S1B CONTROLS GROUP N, O, P, Q, R. AT EACH POSITION OF S1A AND S1B CERTAIN TERMINALS IN EACH GROUP ARE GROUNDED AND THE OTHER TERMINALS OF THE GROUP ARE CONNECTED TOGETHER, FREE OF GROUND. SEE TABLE 1.

27181X1

Figure 6-19A. CC-13A Custom Control Unit, Schematic Diagram



NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-19A.
2. WIRES MARKED WITH COLOR NOTE ARE #24 STRANDED COPPER, TEFLON INSULATION.
3. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE #22 SOLID COPPER, TEFLON INSULATION.
4. UNMARKED WIRE IS #24 BARE, SOLID, TINNED COPPER.
5. WIRES OR GROUPS OF WIRES MARKED "T" ARE COVERED WITH VINYLITE TUBING OF APPROPRIATE SIZE.

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Figure 6-20A. CC-13A Custom Control Unit, Wiring Diagram

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